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ADDRESS.

THE PRINCIPLES OF MEDICAL CLIMATOLOGY.

Delivered at the Twelfth Annual Meeting of the American Climatological Association, at Hot Springs, Va., June 18, 1895.

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In presenting to you some thoughts upon medical climatology and its underlying principles, I am mindful that while the profession as a whole are lamentably ignorant of the principles of climatology, and sadly careless and ignorant in their application, and need instruction in the very grammar of the subject, I have now the honor of addressing those whose reputation and presence here are assurances of their knowledge and serious interest in climatic study. I shall therefore, as far as possible, avoid dwelling upon well-known facts, but it would seem wise to first define the subject we are to consider.

Climate implies the physical peculiarities of a given locality, while climatology is the study of these various climates with their special correspondences and their effects upon man.

Medical climatology, in the arrangement of its various departments, may be compared to a pyramid, the broad base of which is formed of the study of climatic physics which include the essence of meteorology and certain portions of geography, geology, botany and zoology. Resting upon this physical foundation is the tier, formed of the physiologic effects of climate, this being the study of the influence of the various physical elements of climate separately, first, and then in combination, upon the natural human being, the first consideration being the influence upon special organs and functions, and then upon the human organism as a whole. When this point is arrived at we reach the next department or tier in our pyramid, where inquiry leads to the distinctions of race; how they have been located and modified by special climates, first in their physiologic peculiarities and next in their pathologic, so that we have placed upon the layer of physiology one of ethnology and upon this, again, a tier of geographical pathology. By the latter, we are taught the special tendencies and dangers of each climate. Next, the classification of climates followed by the study of special climates and localities should claim our attention.

We have at length arrived at a sufficient elevation on our pyramid of knowledge to undertake the building up of the apex of our structure with climatic therapeutics, beginning with a tier composed of general climato-therapy, that is, a consideration of what diseases and what stages and forms of them are likely to be benefited by any climatic change. Next, the particular climates suited for the special diseases. Then the study of the influence of climate upon the various temperaments and diatheses and, finally, the point is reached of the individual case and its appropriate climatic treatment.

Thus, climatology is based upon:

1. Physics.
2. Physiology.
3. Ethnology.
4. Geographical pathology.
5. Classification of climates.
6. Special climates.
7. General climato-therapy.
8. Individual climato-therapy.
9. The individual case and its appropriate climate.

Under the head of physics, we find certain matters connected with meteorology, worthy of emphasis and consideration. The meteorology of a given locality is broadly divided between the general meteorology of the hemisphere, State and latitude, and the local. General meteorology is being developed most efficiently by the Government Weather Bureau, and we must do all we can to aid them, especially in their new department of medical climatology, in which by collecting the necessary morbidity and mortality statistics from all parts of the country, the relations of sickness and death to the state of the general weather will be made apparent; and in time, perhaps, warning may be given to the delicate, as it now is to mariners and farmers.

The comparison of the general weather and its results with that of special localities and their health will serve to show how the general weather of a given week is modified or intensified by local conditions. In local weather reports it behooves us to urge the stating of them more fully, especially with regard to humidity, sunshine and wind and a separation of reports into seasons, and again a showing of what I have termed, in reporting upon Colorado Springs weather, as an *invalid's day;* that is, the average state of the weather during the hours the invalid can and should be out. While night air that is not too damp or chilling to permit of open windows is desirable, especially on account of its purity, yet the influence of the night climate when injurious can be much more easily modified than that of the day, and should be considered separately.

Under the head of physical conditions there is one point that is far too infrequently reported and too little dwelt upon by the physicians of this country, —the soil; whereas, in Europe, experience and the teachings of science have made it one of the prime factors in judging of a health resort, although a distinguished American physician, the late Henry I. Bowditch, was the first to study and demonstrate the importance of considering the soil in selecting a residence, which has been since abundantly confirmed by the labors of others. It is not only the material of which the soil is composed that must be considered, but also its natural drainage and the disposition of

its watershed. The importance of this consideration, while we all present here admit, perhaps we do not sufficiently dwell upon to our clients and our colleagues; often do we find a town in a health-giving air with good surrounding soil, yet situated in a river bottom, recommended for invalids; or a flourishing health resort under benignant skies, built upon a clay bed, or in a basin which can not drain.

Again, while the meteorology of a place is of great importance *per se*, it is very much more so in connection with the other conditions, such as elevation, aspect, shelter and soil, as these together make climate; the other alone only weather, and paradoxical as it may appear, it sometimes happens that the climate continues good even when the weather is temporarily bad.

There is another point that is worth remembering, that the pleasantest climate to the invalid is not always the best for him. While to come "unto a land where it was always afternoon" is well suited for some, others fare better where the cry of "Cease, rude Boreas," is often heard. Thus while a sedative climate is frequently called for, a tonic one is still more often needed. Remember, all our climatic prescriptions can not be sugar-coated.

Passing now to the study of physiology in connection with climatic therapeutics, we see a field white for the harvest, and it is only from the corn gathered in this field that the bread of knowledge can be made which is alone worthy to be served on the table of the climatologist. But, alas, to produce good physiologic work, time and money are the first requisites, in neither of which do we as a profession abound. There is a crying need for well trained and well paid physiologists in well-equipped laboratories in all the chief sanitaria of the world, and it is only by placing the knowledge gained through them freely before the therapeutist that our branch of medicine can advance from the present gloom of fiction and tradition, which now is but faintly illumined with a few isolated facts, and from which the health-seeker endeavors to emerge, guided more often by the rush-light of empiricism, or led astray by the will-o'-the-wisp of false theory, than by the lamp of science. Some of these lines of investigation are a fuller study of the influence of sunlight and sun heat upon physiologic and pathologic conditions, and some good work has lately been done in their effects upon bacteria. This work could be carried on most efficiently in climates where sunlight was most brilliant. The influence of atmospheric electricity, and the influence of humidity with both high and low temperature also needs study.

Further experiments are needed upon the effects of diminished barometric pressure; while excellent work has been done by Paul Bert, Muntz, Regnard, Viault, Egger, Woolff and Koeppe, in which the blood changes have been noted, yet they need carrying on further, and particularly by physiologists resident in high altitudes, so that it can be demonstrated clearly what are the permanent and what the transitory effects. These investigations have gone far to make it probable that the blood changes, such as the increase of red corpuscles and hemoglobin, are the reason for the undoubted clinical fact that altitude is *per se*, the most valuable climatic factor in combating the progress of tuberculosis. While this can be reasonably inferred it is not yet absolutely proved.

It should also be demonstrated what are the blood changes, if any, brought about by residence upon the ocean or sea islands, as similar results upon tuberculosis to those in mountain air are sometimes brought about. The effects of sea and mountain air upon the nervous system need much elucidating. Again, the influence of atmospheric electricity upon the human organism stands ready for explanation.

To you, I need scarcely enumerate the many branches of study that require more extended work by the climatic physiologist to make way for the pathologist, with the therapeutist in his wake. While we ask for more workers and more means, we must not be unmindful of those who have already entered into, and are still laboring skillfully and manfully in this field.

In ethnology much good work has been done, but we need the collaboration of the ethnologist with the climatologist, so that the lessons ethnology can teach us of climatic influence, especially in transplanted races, extending over long periods of time, can be applied to the elucidation of the more immediate effects of climatic changes upon individuals in the present.

In geographical pathology the volumes of Hirsch stand out as a monument of systematic, elaborate and successful research in this field, while the work of Davidson and studies such as those of Matthews on the North American Indians, have added much to this department of climatology.

Passing on to the classification of climate, we are confronted with one of the greatest stumbling blocks in the way of placing climatology upon a really scientific basis. The interlacing and interdependence of the various factors which go to make climate and the modifications of their relative and combined influences by seasons, by local conditions, and also by remote influences makes it wellnigh impossible to formulate any classification of climates that is not imperfect and open to many objections. Therefore at present, at least, this can not be accomplished with scientific accuracy, but only in a broad and general way.

The geographical divisions of climate are comparatively easy, as into sea and land; the former with its subdivisions of ocean, island and coast, and the latter with its divisions by elevation, and again, a classification by position to the equator is not difficult. But it is when we come to classify the whole by important meteorological conditions then we find the serious difficulties. What do we mean by a dry, or what by a damp climate? Of course, when we think of extreme instances we know what we mean. But where are we to draw the line, and are we to judge by the absolute amount of moisture in each cubic foot of air for comparison, or by this relation to the temperature. Is it the absolute or the relative humidity reached or both together which determines the class in which the climate is to be placed? The meteorologists themselves are not yet prepared to clearly explain this question. Though work is going on among them which will assist in clearing off the fog hanging over it, of this nature is the work of Professor Harrington upon what he very happily terms "sensible temperatures." The amount of evaporation from the skin is regulated by the amount of watery vapor present in the air, that is its humidity, and the greater and more rapid the evaporation from the skin, the greater the coolness of its surface, so the cooled blood of the cutaneous

vessels carried into the circulation aids in preventing the general body heat rising above normal. Thus we see the value of recording the temperature of the wet, as well as the dry, bulb of the thermometer. This is an interesting subject to pursue into its therapeutic aspect, but *verbum sapientis*.

Passing to the tier composed of special climates, I will merely say that in my opinion too little consideration is shown to the circumstances of the particular place as regards food, lodging, work and amusements. So often, while the general climatic conditions are favorable, yet after all, the sending of that particular patient to that particular place is a failure, it is a case of a round man in a square hole, or *vice versa*, and while the disease may have been placed in the appropriate climate the individual has not. As Julius Braun said so admirably in his classic work on "Baths and Health Resorts:" "You have to consider not only the individual sickness, but the sick individual in climatic therapeutics." There is much to be said, from which the clock's warning face bids me refrain, but do let us remember the advice I heard Frank Buckland, the naturalist, once give: "When you get hold of a fact, pin it down for future use." When found, make a note of it. It is the slow accumulation of these, brought together by many hands, in many lands, which will ultimately give us a scientific climatotherapy. In the recording of cases of phthisis, treated by climate, especially as to results, the history must be sought and reported over long periods to be of real value, and I know full well, this entails much labor and can, with the best endeavors, be only followed in a few out of many cases that are seen.

It is not the results of any one man or place that are of so much value as their use with many others; their family likenesses as it were, are brought out and one report aids and corrects the other. Again, for comparison, do let us receive more facts concerning the natural history of phthisis as seen by city physicians, where no climatic change could be noted. Sometimes we congratulate ourselves that while a case of phthisis did not recover, yet it lived for some time, say for fifteen years, and think that here at least we see the retarding effects of a certain climate; but turning to the pages of such careful observers as Flint, we are led to doubt this special influence when we find similar cases recorded living as long without using such climates.

I must now cease giving you these scattered suggestions concerning the principles of climatology and close this brief review of the general subject, to make way for the more important discussion of its various branches, of which the program with its names of authors promises us a rich feast. This is a gathering where the men of the sea, of the plain, of the mountain, of the city and hamlet are drawn from their homes, in many cases hundreds of miles apart, to study and advance the science of climatology.

FOURTH OF JULY SURGERY.—A recent issue of *Puck* has the following timely skit: "Physician (as he finishes bandaging up Mr. Oldboy, who has unsuccessfully set off some fireworks): 'Well, how do you feel?' Oldboy (in muffled tones): 'Just like a boy again.'"

LAUGHTER IS THE STAFF OF LIFE.—Mr. Joshua Billings believes that "Every time a man laughs he takes a kink out of the chain of life, and thus lengthens it."

ORIGINAL ARTICLES.

THE TREATMENT OF MALIGNANT TUMORS BY THE TOXINS OF THE STREPTOCOCCUS OF ERYSIPELAS.

Read in the Section on Surgery and Anatomy, at the Forty-sixth Annual Meeting of the American Medical Association, at Baltimore, Md., May 7-10, 1895.

BY N. SENN, M.D., PH.D., LL.D.

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It has been known for a long time that in exceptional cases an attack of erysipelas has exerted a curative effect on malignant tumors. A number of years ago Billroth reported a case of inoperable sarcoma of the pharynx cured by a severe attack of facial erysipelas. The tumor mass sloughed and the large defect healed rapidly by granulation, leaving a healthy scar upon the site occupied by the tumor. Isolated cases of this kind have been reported from time to time, but the diagnosis was not always established by sufficiently careful clinical observations and microscopic examination of the tumor tissue. The discovery of the microbe of erysipelas by Fehleisen, and the cultivation of the streptococcus upon artificial nutrient media outside of the body enabled investigators to produce erysipelas artificially in the uncomplicated form in man and the lower animals. As soon as it was demonstrated experimentally that simple uncomplicated erysipelas is a disease attended by but little danger to life, the suggestion was made that, if the disease could be artificially produced in man by inoculation with pure cultures, the local and general conditions thus produced might prove useful in the cure or amelioration of inoperable malignant tumors. Of seven persons the subjects of malignant tumors, inoculated by Fehleisen with pure cultures, six developed typical erysipelas; in the seventh case the patient had passed through an attack of erysipelas only a few weeks previously and was, in all probability, still protected against a new attack. This patient was inoculated a second time with a negative result. Fehleisen has seen, by this treatment, a cancer of the breast become smaller, while a case of fibro-sarcoma and another of sarcoma were not materially affected by this method of treatment.

Janicke and Neisser have recorded a death from the erysipelas thus intentionally produced, in a case of cancer of the breast beyond the reach of an operation. At the post-mortem it was shown that the tumor had almost completely disappeared, and the microscopic examination of portions that had remained appeared to prove that the tumor cells had been destroyed through the direct action of the microbes.

Biedert saw in a child suffering from a sarcoma, involving the posterior part of the cavity of the mouth and pharynx of the left half of the tongue, the nasopharyngeal space and the right orbit, the tumor disappear almost completely during an attack of erysipelas.

Kleeblatt reports the case of a lympho-sarcoma followed by infection of the cervical glands, in which the tumors diminished markedly in size under the influence of an inter-current attack of erysipelas, but resumed its former malignant tendencies as soon as the disease had subsided. The patient was afterward intentionally inoculated with a pure culture of the

streptococcus of erysipelas, but the beneficial effect was, as before, only a temporary one, as the tumors steadily increased in size, the patient dying of exhaustion. In another somewhat similar case, the inoculation caused a typical attack of erysipelas, under the influence of which the tumor rapidly disappeared.

Cases, on the other hand, have been reported in which, after an accidental or intentional attack of erysipelas, the malignant tumor began to grow more rapidly. Neelsen describes a case of carcinoma of the breast in which, after two severe attacks of erysipelas, the tumor not only began to grow faster, but at the same time regional infection progressed more rapidly.

Bruns gives an account of the effect of erysipelas on tumors in twenty-two patients. Among these, three cases of sarcoma were permanently cured. Two cases of multiple keloid after burns were also permanently benefited. In four cases of lymphoma of the neck, some of the glandular swellings disappeared completely and some were reduced in size. In three cases of carcinoma of the breast, one was not influenced by the treatment, in one the tumor was diminished one-half in size, and in the third it contracted to the size of a pea, in which condition it remained at the time the report was made. A multiple fibro-sarcoma was greatly benefited, while an orbital sarcoma was not improved.

Spraenth concludes as the result of his observations that the products of the erysipelatous inflammation in certain cases can act in a curative manner upon malignant growths. He injected subcutaneously at a point distant from the tumor the sterilized toxic products of the microbes of erysipelas. Improvement and even complete disappearance of the tumors followed, although recurrence usually took place. The effect was much more marked in sarcoma than in carcinoma.

Burch observed that as a result of accidental or intentional infections with the microbe of erysipelas, tumors such as sarcoma disappeared by fatty degeneration.

Janicke and Neisser demonstrated by microscopic examination that cancer cells were actually destroyed by erysipelas streptococci. In view of the uncertainty of the result and the not inconsiderable danger to life which attends the inoculation of live cultures of the streptococcus of erysipelas, in patients debilitated by antecedent disease, it is safe to predict that this therapeutic resource will be abandoned in the future treatment of malignant tumors.

Coley, of New York, has made the treatment of malignant tumors with live and sterilized cultures of the streptococcus of erysipelas a special study since 1891. In 1893 he reported ten new cases of malignant tumors treated by repeated inoculations with erysipelas. From a study of the literature of this subject at that time it was found that there were recorded thirty-eight cases of malignant tumors in which an attack of erysipelas had occurred, either by accident or intent. In thirty-three cases the erysipelas was accidental and in fifteen it was the result of inoculation. Of seventeen cases of carcinoma, three were permanently cured. Of the seventeen cases of sarcoma, seven were free from recurrence from one to seven years after the attack of erysipelas. Ten cases showed quite marked improvement; one patient died as the result of an accidental attack of erysipelas.

In the summary of the analysis of recorded cases, Coley excluded eight cases of his own, treated by repeated inoculations with erysipelas cultures; in none of these cases did an actual attack of erysipelas result, and yet the inoculations appear to have been followed by marked improvement, and this would indicate that there exists in the cultures some substance which is antagonistic to the tumor growth.

In view of the fact that the artificial production of erysipelas by inoculations with active cultures of the erysipelas microbe is not devoid of risk to life, and that improvement in certain cases followed, by inoculations with live cultures, which did not produce erysipelas; these facts led Coley and others to employ sterilized cultures, which appear to have produced the same therapeutic effects as the active cultures.

It was also ascertained by experiments that the efficiency of the dead cultures is increased by the addition of the bacillus prodigiosus, a comparatively harmless microbe. In a recent article on the treatment of malignant tumors with the toxins of these two microbes, Coley maintains the efficiency of the mixed dead cultures of these two microbes in the treatment of some cases of malignant tumors, especially sarcoma. In the same publication he reports nine cases of inoperable sarcoma permanently cured by repeated inoculations with the mixed toxins of these two microbes, that came under his own observation, and refers to a few successful cases in the practice of other physicians. The toxins which he uses now are prepared in the following manner:

"*Method of Preparation of the Toxins.*—To make the toxins of erysipelas and prodigiosus, ordinary peptonized bouillon is put into small flasks, containing 50 to 100 cc., which, after proper sterilization, are inoculated with the streptococci of erysipelas and allowed to grow for three weeks at a temperature of 30 to 35 degrees C. The flasks are then inoculated with bacillus prodigiosus, and the cultures allowed to grow for another ten or twelve days at room temperature. At the end of that time, after being well shaken up, the cultures are poured into sterilized glass-stoppered one-half ounce bottles, and heated to a temperature of 50 to 60 degrees C. for an hour; sufficient to render them perfectly sterile. After cooling, a little powdered thymol is added as a preservative, and the toxins are ready for use. The toxins when prepared in this way are very much stronger than when filtered through a Pasteur, Chamberland or Kitasato filter, the active principles contained in the germs themselves being preserved. If, as is sometimes the case, the preparation is found to be too strong to use with safety, it can be diluted with glycerin or sterilized water.

"The best method of making the bouillon is to soak a pound of chopped lean meat over night in water. In the morning strain it through a cloth, make up to 1,000 cc., and boil for one hour. Then filter through a cloth, add peptone and salt, neutralize and boil again for an hour. The bouillon will then pass through filter-paper perfectly clear, and be ready to put into the flasks. It is not, however, necessary to neutralize the bouillon, as the streptococci will grow even more readily in acid bouillon, and the resulting preparation is, if anything, stronger than when neutralized bouillon is used.

"In order to keep up the virulence of the cultures they are put through rabbits in the following way: the hair of the ear is clipped close with a pair of scissors, and the skin washed with weak carbolic

acid, and then sterilized water. A minute quantity of a bouillon culture, forty-eight hours old, is then injected subcutaneously in four or five different places in the ear. Forty-eight hours later, after again washing the ear with carbolic acid and sterilized water, a flat needle sterilized in the flame is inserted under the skin at or near the point of inoculation, and the layer of the skin cut off with a sharp sterilized scalpel. The piece of skin is then rubbed well over the surface of an agar tube with a thick platinum-wire needle. After twenty-four hours in the incubator the colonies of streptococci will show as minute white specks, and from them a pure culture can be obtained. If the agar is made with 75 per cent. of bouillon and 25 per cent. of urine, the streptococci will grow more freely than if bouillon alone is used. The dose of this preparation varies from 1 to 8 minims; I have had a temperature of 105 degrees F. follow the injection of 2 minims. I usually begin with the minimum dose and gradually increase until the desired reaction, *e, g.*, temperature 103 to 104 degrees F. is reached."

Coley does not say that this treatment is successful in all cases, and reports his failures with his successful cases, but his satisfactory results are out of proportion to those of any other practitioner, in the employment of the same remedy in similar cases. It is generally known that carcinoma has proved more refractory to the toxins of the streptococcus of erysipelas and the mixed toxins than sarcoma.

A distinction should be made between the therapeutic action of non-malignant tumors of erysipelas and the subcutaneous injections of sterilized cultures of the microbe of this disease. In erysipelas involving a malignant tumor, the superficial lymphatic channels are the seat of an active inflammation, the product of which always temporarily obstructs the pathways through which local, regional and general infections occur and, in exceptional cases, permanent interruption of the lymph current may limit or arrest the growth of the tumor. No such anatomic changes are produced by the injection of the toxins.

The treatment of inoperable sarcoma and carcinoma with the mixed toxins, as advised and practiced by Coley, has been given a fair trial in the surgical clinic of Rush Medical College, and so far it has resulted uniformly in failure.

The accompanying table is a brief summary of the cases subjected to this treatment.

The injections were made daily, gradually increasing the dose until the desired reaction was produced. In most of the cases the reaction was initiated by a chill, or at least a sense of chilliness. The temperature reached the maximum height in the course of a few hours, and continued from six to twenty-four hours. The toxins used were obtained from three different sources, the last supply directly through the courtesy of Dr. Lambert, of the laboratory of the Cancer Hospital, New York. A temporary swelling and diffuse reddening of the skin at the point of puncture was a common occurrence; abscess formation was seldom observed. Loss of appetite, restlessness and insomnia were some of the general symptoms most constantly produced by the injections, when used in doses large enough to provoke febrile reaction. In all of the cases, the injections failed to effect even temporary improvement, and in some of them the local and general conditions appeared to be aggravated by the treatment. The results of this treatment have been most discouraging in my hands, and although I shall continue to resort to it in otherwise hopeless cases in the future, I have become satisfied that it will be abandoned in the near future and assigned to a place in the long list of obsolete remedies employed at different times in the treatment of malignant tumors, beyond the reach of a radical operation.

Name.	Age.	Tumor.	Number of injections.	Dose in minims.		Reaction.
				Minimum.	Maximum.	
Ross.	35	Multiple melano-sarcoma of breast and sub-clavicular lymphatic glands . . .	25	3	10	101° F.
Nelson.	32	Sarcoma of testicle, regional infection of inguinal glands.	25	3	8	100° F.
Sherwood	47	Sarcoma of thigh.	50	6	9	103° F.
Hickman. . . .	50	Recurring sarcoma of shoulder after amputation through shoulder joint	110	5	12	104° F.
Leichsenring.	48	Fascia sarcoma of back.	40	2	12	102° F.
Scott.	56	Carcinoma of penis. Infection of lymphatic glands of groin on both sides.	30	7	8	103° F.
Young.	55	Sarcoma of humerus.	65	4	12	102° F.
Ehrlitz.	52	Secondary carcinoma of lymphatic glands of ureter.	25	5	10	103° F.
Moylus.	45	Carcinoma of uterus.	75	4	15	104° F.

DISCUSSION.

Dr. W. B. Coley—I wish to thank you for the courtesy you have extended me by asking me to open the discussion on a subject in which I have been deeply interested during the past four years. I hesitate to offer my own experience against that of so distinguished a surgeon as Dr. Senn, and I will first say that I heartily commend Dr. Senn for bringing before you his own results from the treatment with the toxins, —failures though they be. No scientific opinion as to the value of the treatment will be possible unless the failures as well as the successes are recorded, and I myself have conscientiously endeavored to follow this method in my own work.

Since May 3, 1891, I have treated eighty-four cases of inoperable malignant tumors with the toxins of erysipelas and bacillus prodigiosus, and it seems to me that a careful study of these cases, extending over a period of four years, ought to enable us to formulate some definite conclusions as to three very important questions:

1. Have these toxins a destructive effect upon malignant tumors?
2. Is this effect merely temporary, or permanent?
3. What forms of tumors are most susceptible to the action of the toxins?

A study of my own cases shows that of forty-three cases of inoperable sarcoma treated with the toxins, eleven have been successful. One of these has since had a return of the trouble; one has gone nearly four years; two, more than two years; and two, one and one-half years, without relapse.

Within one month I have presented three cases before the Surgical Section of the New York Academy of Medicine, two of which had gone more than two years since treatment, and still remain in perfect health. These results are indisputable facts, the diagnosis having been established, not only clinically by the leading surgeons of the East, but confirmed microscopically by the best pathologists; and if further evidence were needed, the fact that a number of them had rapidly recurred after operation, would be enough to establish

their malignancy. If the diagnosis is still doubted, after having been subjected to all these tests, it seems to me that we had better at once abandon the discussion as to the treatment of sarcoma, and employ our time in learning how to make a diagnosis.

In regard to carcinoma, up to the time of my last paper read before the Academy of Medicine, Nov. 15, 1894, I had nothing but improvement follow the treatment in cases of carcinoma, and I have never advocated the toxins in carcinoma except as a matter of experiment, though I confidently believed that in time good results would be obtained in this as in sarcoma.

Since November I have had two cases of epithelioma entirely disappear. One was a very rapidly growing epithelioma, involving the lower jaw and floor of the mouth and chin. The case was sent to me by Dr. George R. Fowler of Brooklyn, in July, 1894, and was treated about three months at the New York Cancer Hospital. She has had no treatment since November; no evidence of the growth can be found, and the woman is now in perfect health. The entire tumor had developed in a space of four months, and the involvement was so extensive that Dr. Fowler regarded it as hopeless from an operative standpoint.

Against this positive evidence, based upon eighty-four cases, extending over a period of four years, Dr. Senn has presented on the other side nine cases, covering a very brief period of observation. If we analyze them, what do we find? We find first, three of the cases were carcinoma, a class of tumors in which I have not advocated the treatment. A fourth case was a melano-sarcoma, a rare form of sarcoma, of which I have treated three cases without success. The fifth and sixth cases were very advanced osteo-sarcoma, which I distinctly stated in my paper were the least influenced by the toxins. There remain but three cases upon which he can justly base an argument against the value of the toxins. With this limited experience, covering so short a period of time, Dr. Senn tells you that the treatment is valueless, and in another year will be entirely abandoned. I can only say that, if I continue to have as many successes in the coming year as I have in the past, I venture to predict that I for one shall be using the treatment, and I do not believe that I shall be the only one.

ON SOME POINTS IN REGARD TO STERILIZATION IN PRIVATE DWELLINGS, WITH THE DEMONSTRATION OF SOME NEW ASEPTIC APPLIANCES.

Read in the Section on Surgery and Anatomy, at the Forty-sixth Annual Meeting of the American Medical Association, at Baltimore, Md., May 7–10, 1895.

BY CARL BECK, M.D.

NEW YORK.

Since the experiments of Petri and Cleves-Symmer have demonstrated that by bacteriologic test, what long before appeared to be probable on the base of clinical observation, namely, that the atmosphere has practically no bearing upon infection, but that the human body is invaded by bacteria by contact; in other words, by the wounding instrument, by the hands of the surgeon, by clothing or by the skin of the patient, the question of operating inside the hospital has entered a new stage.

As besides Lister, the father of modern wound treatment, there is still a considerable number of surgeons who maintain that the atmosphere has at least *some* bearing upon infection, I thought it to be well worth while to refer to the experiments alluded to from a strictly surgical standpoint.

Petri fixed the special forms of microbes suspended in the atmosphere and ascertained at the same time the number of microbes present in a determined volume of air. He determined the presence of microbes by pumping a measured volume of air through a filter of sterilized sand. This sand, to which all the microbes of the atmosphere adhere, he distributed on Petri's plates containing sterilized gelatin. On this gelatin the microbes multiplied by forming as many separate colonies as there were microbes, so that the latter could easily be counted. By determining the next question, namely, that of the number of microbes settling within a fixed time upon a wound surface of a certain area, he found that a parallelism could not be assumed between the microbe capacity of the air and the quantity of the deposits. It would naturally be expected, that air containing only a few microbes would deposit but few upon wounds, and *vice versa*. But this parallelism does not always exist, as the microbes are not equally distributed in the air, but some regions are densely and some are sparsely populated. This fact can be shown, if according to Cleves-Symmer several gelatin plates are exposed at the same time and if the different plates are kept in the same part of the room. Then a great difference as regards quantity and quality is found, for neither the same kind nor the same quantity of microbes settle upon the plates.

Cleves-Symmer also exposed gelatin plates for seven days simultaneously in three surgical wards. This exposure was made five times a day; the first at 5 o'clock A.M., while the patients were asleep, and the second at 7 o'clock A.M., after the floors were first washed and then scrubbed. Similar exposures were made at 9 A.M., when operations were generally performed, and the last exposures were made late in the afternoon. The sterile gelatin was contained in round, flat, large-surface Petri dishes. After they had been exposed each time for twenty minutes, they were covered and preserved in a moist incubator in which the temperature was that of the room. The developing colonies, as soon as they could be recognized by the naked eye, were counted daily, and were observed so long as they could be distinguished from one another. Among 4,613 microbes so developed there was found but one pathogenic microbe, which was the bacillus pyocyaneus. At a time when nearly every third case in the hospital suffered from a wound in the secretion of which this bacillus was contained, there were certainly ample opportunities for it to permeate the atmosphere; if, despite this, a pathogenic microbe was found but once, it is proof enough that the air contains necessarily very few pathogenic microbes.

Clinical experience accords with this. The operating rooms of Billroth at the old "Allgemeines Krankenhaus" in Vienna were far from being an anti-infectious ideal. The same remark applies to many other celebrated operating rooms, among which I may only mention the Albert Amphitheater in the same city and the one of the eminent surgeon, Gussenbauer, in Prague. As far as my own experience is concerned, I may state that it is also in accord with these theoretical propositions. So, for instance, were the average results in St. Mark's Hospital, New York, about just as good in its old building (the very poor accommodations in which premised all the elements of atmospheric infection, since the most rigid observations of aseptic principles were carried out in reference to all objects that came into direct contact with the wound), as those obtained in the new building, which merits the designation of a model hospital, particularly with reference to modern aseptic appliances.

If, then, success does not depend upon the marble floor of a modern operating room, and upon more or less complicated apparatus, but upon carrying out the principles of asepsis so far as direct contact with

wounds is concerned, there is no reason, why aseptic operations could not be performed almost anywhere.

If it would really be as Neuber, one of the most distinguished pioneers of aseptic principles, maintains, that the arrangements of the operating rooms are the main requisites for success, it would be no less than a crime to operate outside of the hospital. Neuber lays great stress upon having separate operating rooms (he himself uses five different operating rooms in his own private hospital) and demands at least two different operating rooms for even the smallest hospital; one at least, for septic and one for aseptic cases, each possessing separate furnishings and supplies. There can be no doubt that it is *desirable* to have at least two operating rooms. Their absolute *necessity*, however, is open for discussion. The whole question, after all, seems to converge more and more to the one point, that operations performed in private dwellings entail a great deal more trouble to the surgeon than they would in a hospital, where everything can be carried out with the greatest convenience, so that it is quite natural that a surgeon, when having the choice, would prefer operating in a hospital.

The advocates of atmospheric infection seem to regard every operation performed outside the hospital as a criminal act, more or less. But opinions change quickly nowadays and to quote Schiller: "There is nothing more permanent than constant change." It is only a few years ago since a reputable German surgeon demanded prosecution by law of every surgeon who omitted using carbolic acid during operation. I should not be surprised if the same energetic colleague would demand the arrest of the same unfortunate Æsculapian who did not do the contrary now. It seems to me that there was never a time when operations outside of the hospital were more justifiable than under the present auspices of asepsis. I sincerely hope that this statement will not be mistaken for an endeavor to encourage an inexperienced practitioner to perform major operations. Beside asepsis there are required a great many other points. In the first place, a surgical routine of years' standing; second, there must be at hand well-trained assistance, without which a surgeon is hardly justified in performing major operations.

It is absurd to advise a surgeon to take a bichlorid bath every day, and unnecessary to remove all furniture, paintings, carpets, etc., before operation in a private dwelling, or to wash the walls of the private operating room with bichlorid and scrub them afterward with crumbs of bread. The latter procedures will certainly do no harm if undertaken a few days before the operation, but if done only a few hours before the operation, they will be apt to impregnate the atmosphere with many more microbes, probably also with "pathogenic" microbes, as such maneuvers can not be done without stirring up a considerable quantity of dust, which will settle upon clothing or such other objects, which may afterward come into indirect contact with the wound. It is therefore advisable not to disturb the operating room shortly before operation. But great care should then be taken to keep the tables, chairs, or whatever else should be required for the operation, covered with sterilized, or at least with freshly washed and ironed sheets or towels. If it should have happened that dust was stirred up shortly before operation, floor and walls should be sprinkled, as moisture precipitates the microbes.

For an operating table, a strong kitchen-table may serve, if the surgeon should not prefer to take a portable operating table along. Upon two other tables of medium size the instruments, trays, dressings, sponges, etc., are placed. If such tables are not available, wooden chairs have to answer the purpose. If possible, all such objects as chairs or tables should be scrubbed with soap and hot water and with bichlorid of mercury (1 to 500). Such arrangements can be made under the supervision of an assistant or a nurse, who may be sent to the house of the patient the day before the operation is to take place. They should also see that the patient takes a warm bath and is also shaved in case there should be any hairs present on the field of the operation. Scrubbing with ether and bichlorid should follow these procedures. Then the field of operation should be covered with a large poultice of green soap, which may remain until shortly before operation, except there are signs of susceptibility to dermatitis, in which case a bichlorid solution should be substituted. The nurse must also instruct the family that an abundant supply of boiling water must be ready in large vessels and that there must be at hand a sufficient number of bed sheets and plenty of towels. If tin boilers must be used, they should be scrubbed with sapolio and be covered with sterilized towels. China pitchers and basins may also be prepared in the same manner and afterward washed with a strong bichlorid solution, etc.

As a surgeon must always be prepared for an outside call, he should have a set of asepticized surgical appliances ready in a satchel at his office. I found it convenient to preserve the instruments generally required in linen cases, having a separate one for abdominal sections, one for operations upon the bones, one for the uropoetic system, one for tracheotomy, one for general use, etc. These linen cases may be rolled up and tied in the middle with a cord after being used. The case designated for general use contains such instruments as are required in any operation—that is, scalpels, scissors, forceps, retractors, spoons, probes, needles, etc.,—and is carried along with the one designated for a special operation. For instance, if a herniotomy is to be performed, the "general set" is accompanied by the laparotomy set. These instrument cases can be carried along with the other necessaries in a satchel. I use a satchel of rectangular shape about 42 centimeters long, which gives ample space for the instruments required, as well as for the other necessaries, consisting of my folding sterilizer, of a sufficient quantity of trays fitting one into another, of gauze, cotton or moss bandages, silk, catgut, rubber gloves, green soap, soda, bichlorid tablets, ether (resp. chloroform, morphin tablets, camphorated oil for hypodermic use, brushes, etc. It will sometimes be convenient, to carry the surgeon's coats, towels, sheets, etc., to the house also. The brushes for scrubbing the skin surface, if sterilized, can be carried in sterilized towels, as well as the gauze and the other dressing material. The ligatures are kept best in one of the metal boxes, devised by Schimmelbusch or Braatz or myself. Iodoform gauze, if required, may be carried conveniently in a "Duehrssen" receptacle. In reference to my sterilizer, I may be allowed to state that its main advantage consists in its compactness, as its separate parts can be easily put together. Its lower division, which is also the smallest one, consists of a reservoir which fits into a larger division. If desirable, a fourth divi-

sion can be set up. The reservoir of the lowest division must be half filled with a solution of soda. A wire net on which the instruments are to be placed fits into this reservoir. Into the projection of the walls of the second or third division, wire sieves to receive the dressings, towels, sponges, etc., have to be inserted. To the lower division are attached two folding supports between which, when in use, is placed the alcohol lamp which is so constructed as to allow of its being carried along with safety when filled with alcohol. Beside the regular attachments —that is, the alcohol lamp, the wire sieves for the instruments, two hooks for pulling out the latter and the thermometer—a few instruments, a silk box, etc., find ample space in the lower division (reservoir). After being folded together, the height of the apparatus amounts to 6 centimeters. This height is less than one-fourth of that of the whole apparatus when ready for use, which amounts to 27 centimeters. The sterilizer can either be put into an instrument satchel or be carried under the arm. Two quarts of water will be so heated (as indicated by the thermometer fitted into an opening in the lid) as to fill the whole sterilizer with steam of a temperature of 212.1 degrees F. Anthrax spores dried on silk ligatures showed no cultures after they had been exposed to the steam for fifteen minutes. The apparatus is made up now in five different sizes.

37 E. 31st Street.

PROPHYLAXIS IN SURGERY.

Read in the Section on Surgery and Anatomy at the Forty-sixth Annual Meeting of the American Medical Association at Baltimore, Md., May 7-10, 1895.

BY GEORGE WILEY BROOME, M.D.

ST. LOUIS.

In briefly discussing the subject of the prophylaxis of infection in operative surgery, it is my intention to speak also of the measures necessary to prevent unnatural union between tissues under the title given to this paper, and I shall first speak of the operation of amputation as it relates to the prophylaxis of infection and, in connection therewith, the prevention of the amalgamation of heterologous structures in the reparative processes of the wound. But before entering upon the subject I may be permitted to preface the discussion with the observation that there is but one author in the world, so far as I am aware, who holds and advocates the theory that the apposition of peritoneum to peritoneum is a surgical error, although I am clearly cognizant of the fact that thousands of operations terminate in the unnatural union of tissues; that is, the union of tissues of a different kind or nature. But I am also quite certain that such results were not intended by the operator. Mr. J. Greig Smith bases his arguments on the doubt of the principle of sero-serous apposition in connection with intestinal operations, and particularly with the means of providing intestinal drainage. "Many of these operations," he says, "had to be repeatedly performed, and in some of them I dared to ignore the time-honored habit of 'shutting off the cavity' by suturing parietal peritoneum to bowel, and both to skin; often, indeed, I omitted to place sutures of any kind. The practical outcome of this has been, that where I want temporary drainage, with loose adhesions and mobile bowel—as in temporary enterostomy—I suture parietal peritoneum, bowel and skin; but where I desire firm, permanent and intimate adhesion, with no mobility of bowel on parieties—as in celio-colostomy—I implant bowel directly on raw surface, and if this raw surface is small, as it is in thin subjects, I increase it by unfolding or peeling from the parieties more peritoneum, and turning its raw, not its serous, surface from the bowel.

"Further evidence in favor of the strength and durability of sero-fibrous adhesions is supplied by the occurrence and persistence of adhesions when surfaces are left after operation uncovered by peritoneum. Adhesions between bowel and raw surface (such as the stump of a pedicle) may, as we know, be strong enough to cause obstruction. A recent hospital case, where I had to re-open the abdomen for obstruction a week after removal of the appendages for myoma, was a striking example of this. The intestinal wall was positively incorporated with the surface of one of the ligated pedicles; it was quite impossible to tear them apart; it was necessary to cut away a piece of the stump and liberate the intestine. Such adhesions remain to give further trouble also.

"Sero-serous adhesions, on the other hand, tend to disappear; often they disappear very quickly. Indeed, as I have said, where loose and temporary fixation is desired, as in temporary drainage of intestines for obstruction, sero-serous apposition I now believe to be better than sero-fibrous. *One prime advantage of sero-serous union is that it takes place very rapidly, that in a few hours it is water- and gas-tight.* But such union is no more rapid than when peritoneum is opposed to a raw surface. If we bear in mind the histologic forces at work, we can readily understand how this should be; the layer of lymph and young cells which lie between the serous surfaces have little cohesion, and being shut off by a double layer of endothelium from vascularization and from ingrowth of plasma cells, are long in being converted into true granulation tissue. Vascularization is slow and fibrillation is slow, and while they are going on, nature is beginning to get rid of the exuded lymph. Such adhesions often disappear; if they remain they nearly always get thinned and elongated. If there is little to choose between the two, as regards prevention of extravasation of fluids for the first few hours, the sero-fibrous has a decided advantage as time goes on. The lowly organized, inert and loosely coherent plug of lymph is easily disturbed and would be easily broken up in the presence of fluid. This we know to our cost; it is on the second or third day that leakage takes place. A sero-fibrous junction that lasts for a day is practically safe forever, for it goes on improving in strength and solidity.

"The practical application of these principles is as wide as abdominal surgery, and includes not only results to be encouraged, but results to be avoided. Where it is desired to secure quick, strong and permanent union, sero-fibrous apposition is better than sero-serous. Where the union sought need not be strong, and is desired to be only temporary, sero-serous apposition may be adopted.

"In ordinary work, the carrying out of these principles involves some such processes as the following: fibro-fibrous as against sero-serous apposition is carried out in the closure of the parietal wound; in operations for the cure of ventral and umbilical hernia and in kolpo-hysterectomy. Closure of the parietal incision is made by apposition of the raw peritoneal flaps outfolded, and not of the intact se-

rous surfaces inturned. This may incidentally be mentioned, that by abolishing the inward dip of the united peritoneal flaps, it helps to prevent ventral hernia."

I have quoted from Mr. Smith's address upon this subject rather extensively, for the purpose of giving a tolerably clear understanding respecting his arguments and data for the benefit of those who may not have read the article, but desire to know the position assumed in the matter by one so capable of making reliable clinical observations. But going back to my subject, as an illustration of the unintentional, as I take it, of the amalgamation of tissues following the operation of amputation, I have here several photographs taken, regardless of any effort to select the cases, from among the membership of a society in St. Louis organized under the name of the "Knights of Willow." Each one of these knights has at one time or another undergone an amputation of a limb, and, I may add, perhaps 90 per cent. of the members of this society suffer to some certain degree from the consequences of either unnatural adhesions between the tissues or in consequence of the vulnerable position of the cicatrix of the stump. The prophylaxis of these, to say the least, unfortunate sequences consists, from my standpoint, in the following steps in the procedure of an amputation:

1. Purification of the instruments, the disinfection of the hands of the operator and of the entire limb of the patient.

2. The production of artificial anemia by elevating the limb and the application of the constrictor several inches above the point at which it is proposed to amputate.

3. Fashion a long anterior flap by extending the incision down to the sheaths of the muscles and tendons. The entire flap is reflected by dissecting closely to the muscle and tendon, a short posterior flap is reflected backward by a like dissection, when the muscles are severed by a clean circular sweep of the knife down to the bone.

4. About one inch of the periosteum is then exposed below the point at which it is proposed to saw the bone. The periosteum now being incised is reflected upward, after the fashion of a cuff.

5. The soft parts are now to be retracted by an assistant by means of iodoform gauze. The bone is then sawed at an oblique angle for about a quarter of its thickness, when the saw is withdrawn and placed at a right angle with the shaft of the bone and the bone is sawed off.

6. The end of the bone is now carefully trimmed and rounded, the periosteum brought down accurately over the sawed surface of the bone and carefully sutured by means of a small needle armed with very fine, perfectly sterilized silk.

7. The sheaths of the artery and vein are now carefully dissected up, these vessels exposed, the artery first ligated, then the vein ligated separately, after which a single ligature is thrown around both and tied. The sheaths with the attached connective tissues are then carefully sutured over the ends of these vessels by the same means as were employed in covering the bone.

8. The nerve is now dissected from its connective tissue attachments and exposed for two or two and a half inches above the divided muscle, then cut off by means of blunt-pointed scissors. The sheaths and remaining connective tissues are now brought over the ends of the divided muscles and sutured in a similar way to that adopted in covering bone and vessels.

9. A large compress of iodoform gauze is now folded tightly against the stump and the skin flaps brought down over the gauze and held firmly and forcibly against the stump in both hands of the operator, when after the lapse of four or five minutes the constrictor is quickly removed. After the expiration of several minutes more, the operator's hands are relaxed, the iodoform gauze tamponade is removed and the stump carefully inspected, when, if all hemorrhage has ceased and the conditions are favorable for rapid and uninterrupted repair, the flaps are carefully and accurately sutured by means of medium-sized, perfectly sterilized silkworm gut.

10. The wound is now dusted with powdered iodoform, several layers of iodoform gauze brought in contact with the stump, then over this and including the entire leg is placed a heavy layer of absorbent cotton. This is held in position by means of a neatly applied roller bandage.

11. The limb is now placed upon a well-padded posterior splint and another roller made to include this splint and limb.

12. The patient is then put to bed and the limb kept elevated at an angle of about 45 degrees.

I consider the details briefly outlined above, to be absolutely essential in order to secure the prophylaxis of infection, unnatural adhesions and proper position of the cicatrix. These rules will apply to amputations at other points than this.

The chief points to be observed in performing an amputation, according to most of the text-books do not entirely cover what I deem to be wholly essential in order to secure the very best results. For example, if we turn to this subject in the "American System of Surgery," a book which has just passed through the press, we find the subject matter embraces about the following precepts:

"If the conditions essential to a sound and useful stump are constantly kept in view, any of the stereotyped or extemporized methods may with patience and dexterity be made to yield good results. The recognized methods of amputation are circular, the single flap, the double flap, the rectangular flap, the bilateral flap, the periosteal flap.

"The wound must be closed and dressed according to certain principles. The application of hot water by rapid douches to amputation wounds is an excellent method of arresting hemorrhage and preparing the surfaces for prompt union. The hot water must not be allowed to remain in contact with the limb. The vessels having been secured, if the fibrous sheaths are seen, as in amputations at the metacarpal phalangeal articulations, close them with two or three fine sutures, then close the wound with two or three deep and several superficial interrupted sutures. Place in the angles of the wound proper drainage tubes, so as to relieve it of all accumulating fluids. Support the parts in such a manner, by splints, or slings, or pads, that they need not be moved in dressing. Apply such dressings as will support and protect the wound, but admit of easy change."

I do not agree with this teaching, for, in the first place, I think that the indiscriminate use of the drainage tube is unscientific and certainly a prolific source of infection, and hence a practice that is likely to terminate in destroying all the good effects which

would otherwise have been obtained by the scrupulous observance of the steps described above, for when the stump becomes infected, then follow suppurative inflammation and ulceration, with all the baneful sequences. In the repair of inflammation; that is, in the restoration of the tissues to their normal integrity, not only must the inflammatory exudation be removed, but the injury of the tissue caused by the inflammation in the first place must be repaired. In any inflammation there is always a destruction of tissue. Disorganization of the effects of your handicraft on the tissues destroyed must be replaced by a new formation of tissue. Furthermore, by careful and somewhat extensive clinical observation I am clearly convinced that the irrigation of a stump for simple hemostatic purposes is unnecessary, unscientific, and many times a cause of infection. Dry sponging after careful hemostasis by means of the ligature and pressure are productive of far more satisfactory results. Drainage is unnecessary to relieve the accumulation of blood beneath the flaps if the vessels have been properly secured, for the clot which forms to fill up the space underneath the flaps proves to be one of the wisest provisions of nature in hastening permanent and accurate healing. The clot itself being entered by leucocytes in the first instance and subsequently plasma cells penetrate; the latter of which organize into fibrous tissue, while epithelium after a time spreads over its surface.

In the next place, I do not agree that the best results can be obtained by amputating in such a manner as will leave the cicatrix directly over the end of the stump, either transversely, vertically or obliquely. The position of the cicatricial tissue should be remote from the end of the stump. The suggestions of C. W. McCullough, the artificial limb maker of St. Louis, in this respect, I dare say, possess great value, for he tells us that "in all amputations of the leg and thigh, as well as knee disarticulations, the cicatrix should, as far as possible, be placed well away from the extremity of the bone, preferably along the posterior aspect. Contiguity or adhesion of the cicatrix with the extremity of the bone is frequently the cause of suffering. All stumps should be provided with ample flaps, not redundant flaps; a redundance of tissue on the extremity of a stump is of no advantage. The prime office of a flap is to protect the extremity of the bone, and it should be only ample to effectually perform that function. Whether the flaps are anterior or posterior, exterior or interior, or a combination of any of the four, it matters not so long as the extremities are well protected. Periosteal flaps are desirable, as they give additional protection to the bone and prevent integumentary flaps from becoming adherent to the bone. If an amputation is to be done below the middle third of the leg, bones should sacrificed in order to obtain a suitable flap. If the amputation is to be made above the middle third, bone should not be sacrificed, even if transplantation is necessary in order to secure a flap. Every inch of healthy bone above the middle third is desirable for leverage purposes. If a thigh amputation is to be done close to the knee, bone can be sacrificed in order to secure a flap. The nearer the amputation is to be done to the body the greater should be the care to save bone."

While our methods to secure aseptic surgical results are almost perfect, it has been conclusively demonstrated, I believe, to the mind of every observant surgeon, that it is in some instances impossible to render the skin of the abdomen through which a given operation is to be made perfectly free of pathogenic microbes. The circumstance is constantly being forced upon the surgeon's clinical observation that there are pyogenic bacteria living beneath the external layer of the skin which can not be removed from their habitation by measures that will not entail destruction or at least impair the function of the skin of that particular area. We furthermore realize that pathogenic bacteria never migrate beyond the integument unless an avenue is established for their passage. We know also that the integument is the great bulwark against the entrance of pathogenic microörganisms to the underlying tissues, but which when reached there is every requisite for their rapid growth and multiplication and the production of their toxins. So it may be said that the intact skin is invulnerable to these bacteria while, on the other hand, the underlying tissues are positively vulnerable; that is, the former is an absolute hindrance against the pathologic effect of the pus microbe, while the latter furnishes an ideal soil for its growth. These facts must be kept constantly before us if we hope to attain something approaching the ideal in the prophylaxis of infection in operative surgery. I am impressed with the belief that it is absolutely incumbent upon us, in the light of our knowledge respecting this subject, to undertake to revolutionize the unscientific and the unfortunate practice of closing a wound through the abdominal wall by including the skin, fascia, muscle and other tissues by one single suture. It is in dealing with the abdominal cavity that the greatest exploits of surgery have been achieved—exploits surpassing everything that was formerly conceived. The peritoneum which used to be a *noli me tangere* is now entered and closed as fearlessly, especially by the gynecologist, as if it were the playground of surgery.

I have here several photographs intended to illustrate the same idea of prophylaxis in operative surgery that is conveyed in the steps describing an amputation. The flap method and the plan of uniting the underlying tissues should be extended to all of the operations through the surface of the body, particularly in celiotomy, herniotomy, in exposing the stomach, gall bladder and the kidneys. So that it may be understood that my chief aim is that in opening the abdomen, in opening joints, in shortening tendons, in which the skin is non-adherent, in operations upon the patella, skull, or elsewhere, the surgeon should avail himself of the advantages of the prophylactic flap. The chief advantage, as I have already said, consists in placing the wound in the deeper parts at a distance from the skin wound; that is, the skin over the deeper wound is not interfered with, but supports the deeper tissues which have been divided, and rapid healing must take place, hence the risk of infection of the deeper parts from impure skin is reduced to a minimum. In suturing the skin, silkworm gut is always used. The suturing material for the underlying tissues may consist of very fine silk. I need not refer to the necessity of having these suture materials perfectly pure. The former may be boiled five minutes in alcohol, and the latter kept in an Arnold sterilizer for fifteen minutes.

The many advantages of the preliminary flap, recognized by both Horsley and Chiene, are truly of great value, but the scope of general usefulness of

this plan of operating is almost without limitation. I repeat, that as a prophylactic measure against infection, it possesses advantages that can not be equaled by any other known plan, but as a prophylaxis against unnatural adhesions between the skin and subjacent tissue composing the area of a surgical wound, its value can scarcely be estimated. Consider, for example, the remote effects of a straight cut through the skin immediately over the breach of a transverse fracture of the patella, where the fragments have been operated upon for the purpose of securing direct fixation of these fragments. We see a strong unyielding fibrous union between the two cicatrices. The cicatrices becoming amalgamated, the mobility of the patella is lost, and there can be no motion of the patella without dragging the skin with it. This circumstance renders motion of the knee-joint not only painful, but limited. Impairment of function of the entire joint is an unavoidable consequence, and the weight of the person's body can never be supported upon the bended knee, an unfortunate condition that lasts as long as the individual himself, all resulting from defective surgery and not from the actual effects of the original injury, as is too frequently charged.

I have formulated the salient ideas of this paper in the following conclusions, viz.:

1. The value of prophylaxis, in operative surgery as it relates to the formation of the flap and the apposition of homologous tissues, is not apparently fully appreciated by surgeons.

2. In order to derive the greatest benefit from the prophylaxis of infection and the unnatural union of tissue, a flap should be so fashioned in all operations as to carry the cicatrix of the skin away from the incision wound through the underlying structures, and each tissue brought in apposition with its own kind.

3. The particular point at which an amputation is made is not so important with reference to the adaptability of the stump to prosthetic apparatus, as is the execution of the proper technique of the operation.

4. The artificial limb maker of St. Louis appears to be able to adjust artificial limbs to a great variety of stumps and at the same time afford the patient every facility of easy and perfect locomotion by the use of any compensating appliance manufactured, provided the operative procedure outlined in this paper has been completely executed.

5. The flap should be reflected with subsequent suturing of homologous tiseues in operations upon all parts of the body, under the same general principles as are above described, of amputations including herniotomy, supra-pubic cystotomy, celiotomy, gastrotomy, cholecystotomy, nephrotomy, etc.

6. If a wound is made and the operation completed in manner outlined, through unbroken skin and not in the vicinity of, or in communication with some mucous canal and suppuration takes place, it indicates that the surgeon has certainly committed some unavoidable error in his methods.

7. Drainage is never necessary, following an operation conducted in this way through unbroken skin, and into an area free from infection. All such wounds should be tightly closed without drainage, for if the surgeon's aseptic measures are perfect there can be no other necessity for drainage.

8. In the light of Muttman's investigations we may draw the inference that the drainage tube exposes the patient at the deep end of the tube to seventy-eight different species of cutaneous bacteria, and Welsh has shown clearly that one pyogenic variety is resident in the epidermis normally and occupies such a position as to render it safe from any known means of cutaneous disinfection but is prone to travel down along the sides of a drainage tube, and in this way to cause the wound to suppurate.

9. Blood in a wound is not dangerous and where, for the obliteration of cavities therein, the choice lies between a blood clot and the introduction of a drainage tube, which is not only a foreign substance but a prolific cause of infection, it is therefore safer to take the chances with the blood clot.

10. Blood furnishes bactericidal properties, and experiments made by three gentlemen of this city who have become justly distinguished in their respective branches (I mean Welsh, Howard and Halstead) show that virulent pyogenic staphylococci injected into blood clots which have been allowed to fill wound cavities did not multiply and occasioned no suppuration. Irritation of an aseptic wound should never be employed, and the irritation of such a wound with chemic antiseptics can only be contemplated as a coarse and unscientific practice.

11. Iodoform is the ideal antiseptic powder for dusting the line of union of a sutured wound, despite all that has been said against it. It must be conceded that no equivalent for iodoform as a prophylaxis in surgery has been found.

12. The chief aims which the surgeon should try to achieve are: the rapid and undisturbed healing of wounds, the prevention of deformities and the resulting suffering of the patient which cause many to become the victims of evil and vicious habits, the prolongation of human life and usefulness, and, for the attainment of these ends the science of prophylaxis demands prominence and careful consideration in the practice of surgery.

THE MEDICO-LEGAL EXAMINATION OF THE RED STAINS FOUND ON THE CLOTHES OF CHARLES FORD, WITH A PLEA FOR THE USE OF THE CAMERA LUCIDA IN THE MICROSCOPIC EXAMINATION OF BLOOD STAINS.

Read before the Denver and Arapahoe County (Colo.) Medical Society.

BY E. R. AXTELL, M.D.

PROFESSOR OF HISTOLOGY AND BACTERIOLOGY AND CLINICAL LECTURER IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF DENVER; PROFESSOR OF MICROSCOPY IN THE DENVER COLLEGE OF PHARMACY, AND PATHOLOGIST TO ST. LUKE'S HOSPITAL.

DENVER, COLO.

The following is the newspaper account of the tragedy which made my services necessary to the district attorney. It is taken from the *Denver Republican* of Sept. 16, 1894:

"In a dingy brick shack, where scarcely a ray of sunlight ever warms the interior, the dead body of Sadie Smith, a woman about 45 years of age, was found yesterday afternoon about 1:45 o'clock. All the evidences of foul play were upon the body, and little room for doubt remains that the unfortunate woman was the victim of a foul and atrocious murder.

"The murdered woman had been living for nearly two years with a colored man named Charles Ford. They had occupied three rooms in the little brick building in the rear of 1435 12th Street since they became acquainted. Their lives since then have, it is said, been an almost continual round of quarrels and some of the people resident in the

neighborhood say that the white woman and colored man led an existence full of bitterness and struggle.

"Little of the immediate events which led to the terrible deed of yesterday are known. The most that can be gleaned of the woman's movements is that she was alive about 10 o'clock yesterday morning, when she was seen by Mrs. Kleufer, who lives near by. At that hour she went to the fence of Mrs. Kleufer's home and piteously asked Mrs. K. for a nickel. She did not give any reason for the request but Mrs. Kleufer honored it, thinking it was for some necessity. The dead woman had a cut over her right eye which Mrs. Kleufer noticed as she handed her the coin. Beyond this, she says, she noticed nothing unusual about Mrs. Smith. Another neighbor said that Mrs. Smith passed along the alley way shortly after 10 o'clock with a can in her hand as if she was on an errand for beer. This woman avers that Mrs. Smith said "her old man had beaten her again," but further than this observation she did not pass any comment.

"Subsequent to this, nothing appears to be known of the woman until her dead body was found by Ford and some of his friends at 1:45 o'clock. When found she was lying on the bed clothes in a clean undershirt, and with every indication that the body had been very recently subjected to a washing process. Ford did not betray any unusual excitement when confronted with the spectacle, and was loth to express any opinion.

"On every side in the illy furnished house was evidence of a deliberate and consistent attempt to obliterate all traces of the killing. The floor had been scrubbed, the walls here and there wiped down and the bed rearranged.

"The condition of the body when discovered presented a revolting picture. The back of the skull was beaten in until a large hollow was formed, which was filled with blood and hair. A contused wound was over the right eye, while the face was one discolored piece of flabby flesh. The woman's clothes had been removed and an undershirt of cotton texture had been placed on the body. An examination of the lower portion of the body disclosed deep scars upon both thighs. They were of such character as would be inflicted with some blunt instrument.

"The murder was probably committed in the third room, or that which Ford says he occupied. The floor of this room was covered with blood. Near the bed a large pool, about a foot in diameter had formed. In this pool portions of the woman's hair remained. Between this room and where the woman was found is the kitchen, which was also utilized as a sitting and dining room. Undoubtedly the body was carried from the scene of the murder through the kitchen to the room where it was discovered.

Ford's movements after 9 o'clock are not defined. At 4 o'clock in the morning he left the house, to work in Mike Harris' saloon at 15th and Wazee Streets. His story is that he went to the market to get some meat and returned to his house about 9 o'clock. He knocked for admission and called, "Sadie" several times, but could get no reply. He put his meat on top of the shanty and went away and came back between 11:30 and 12 o'clock and made inquiries for the woman. Not learning anything definite of her, he sought a colored friend named Abe Brown and together they went and broke in the door of the shack. His story is that when they broke in the door they found the woman in the condition she was in when found by the officers, to whom Ford went with the information of the murder.

"Ford's story does not tally exactly with those of reported witnesses to his movements. It is said that he was seen entering the house between 9:30 and 10 o'clock, and that about 10:45 o'clock he left with a bundle of clothes wrapped in a newspaper, outside of which was a coat wound around the whole. He was absent about half an hour and came back then without the bundle and with the coat thrown loosely over his right shoulder. After this his actions appear to be lost in darkness, as no one has been found who saw him later than 11:30 o'clock. When Ford was arrested he had on clothes which he had not worn for any length of time. His underclothing had been recently put on and to all questions concerning the location of the clothing he had worn early in the day, he maintained a stolid silence.

"From a study of the wounds, the murder was evidently committed with a flat iron weighing nearly two pounds. This instrument was found in Ford's room, besmeared with blood and with portions of the woman's hair clinging to it."

This, in detail, was the story as first told. Slowly a net of circumstantial evidence was wound around Ford until the presumption was very strong that he was the murderer. He persisted in his story, however, and denied that he had killed the woman. His old clothes, the ones which witnesses stated he had on in the morning when he went to work were found in a distant out-house. Here and there over the clothes were a number of red areas and stains which looked like blood. When questioned about it he said that it might be blood, that he had been hunting a few days before and that he had carried his game across his left shoulder. He was asked as to the nature of the game and he replied: "Oh, some rabbits, a few birds and a black snake." He stoutly denied that he had worn his old clothes within a recent date.

On his shoes, which he wore when arrested, there were a few spots of red staining. When asked about this he said it came from a nose bleed which he had had that morning soon after getting up. Later it was proved that he had had his shoes blackened at about 9 o'clock of the morning the murder was committed, yet the staining was clear and outside of the blacking.

In October, 1894, District Attorney Robert W. Steele had worked up a most astounding array of circumstantial facts which tightened about Ford very closely. Finding that Ford had engaged counsel and seemed to be ready to make a determined fight, he asked me to examine the blood stains on Ford's clothing and on his shoes and to determine, if possible, whether they were of human blood. The following articles were accordingly put by him into my possession, Oct. 22, 1894:

One coat labeled, "worn by Charles Ford in the early morning of Sept. 15, 1894."

Shirt, pants and vest, labeled, "worn by Charles Ford in the early morning of Sept. 15, 1894."

One sombrero, without label, but understood to be the hat which Ford had on when arrested.

One pair men's shoes, labeled, "worn by Charles Ford, Sept. 15, 1894."

With these articles were a great number of odds and ends such as buckets, brushes, pillow cases, flat irons, handkerchiefs and a whip stock—all blood stained and all appropriately labeled. After the examination of the coat as labeled above, I dictated the following: "coat old and ragged, a faded blue check. Nothing like a blood stain is found on inner facing or lining or on sleeve lining. There are a number of grease spots on the right side but nothing resembling a blood stain. On the left sleeve, on its outer side, from the elbow down there are a great number of small and large areas of red staining, which are prominent to the naked eye and which look as though they had been brushed over with a cloth." On applying the chemic test for blood, this gave me a brilliant reaction. Of this test I shall speak later. Of the vest, shirt and pants, the following notes were made: "The vest shows no blood, neither on inner nor on outer side. The shirt is a flannel one with no blood on it. A few stains found on inside of the wrist of the right sleeve prove to be not blood on chemical examination. The pants are badly worn, especially in the seat. They are patched in a number of places, are very dusty and are very much wrinkled as though recently washed. On the right leg of the pants, at the bottom on the outer side posteriorly are five areas of reddish staining, varying in size from one-fourth to one inch in diameter, which to the naked eye give but slight appearance of blood, but by chemic test give blood reaction. Other obscure stains on front

of this leg gave blood reaction to a slight extent. The left leg presents a number of areas, some very large, which present all appearances of blood stains and which when tested give the blood reaction."

"The sombrero, of a dull gray color, is old, worn and torn. On the crown are eight or ten small spots and one large one, all of which present appearances of blood and all of which give blood reaction to the chemic test. On the upper surface of the brim there is one streak of blood, one inch in length and one-quarter of an inch in width. This is a very prominent blood streak. The right shoe shows a thin brownish film over the outer side of the upper for a distance of two inches. This film is external to the blacking and can be scraped off without disturbing the blacking. On the instep of the sole of this shoe there is a small blood stain. On the left shoe, on the inner side of the upper, there is seen a small brownish film, external to the blacking."

My first examination was thus purely one of general appearance, plus the use of the chemic test. In my examination of the general appearance, I used a small magnifying glass constantly. The chemic test for blood, for any kind of blood, is a simple one but of great value because of its accuracy. It is called the guaiacum test for blood. When a red substance is thought to be blood, a bit of it can be moistened, if necessary, by distilled water and after it is gotten in solution, placed on a piece of white blotting paper. On the stain thus formed a drop of the tincture of guaiacum is added. This tincture should be fresh and made from the inner portion of the pearls of the gum. If the stain turns blue with no other treatment it is not blood, but if it contains blood it also contains starch, a salt of iron or some other foreign substance. If no change follows the application of the guaiacum, drop upon it a little watery solution of peroxid of hydrogen, when if it is blood, it will quickly assume a beautiful sapphire-blue color. By this test I have detected a particle of blood which was scarcely visible to the naked eye. It has a few fallacies which must be spoken of. Never must the guaiacum and peroxid of hydrogen be mixed before application. Always apply the tincture of guaiacum first and add the peroxid afterward. Any acid containing iron vitiates the guaiacum test. Some kinds of paper sized with alum contain iron and turn blue with guaiacum. Gluten and starch turns guaiacum blue without peroxid. If no blue color is produced by adding tincture of guaiacum and if then hydrogen dioxid is added and a blue color is produced quickly the substance examined is almost certainly blood.

In my examination of the stains in this case, I either scraped a small bit away and got it in solution, or I added to the stain a bit of water and later a drop of tincture of guaiacum, and later still a drop of hydrogen peroxid. Then by pressing white paper against it, paper free from alum and iron, I got the blue color from the stain, printed on the paper.

The chemic test told me positively that I had blood on the clothes examined. But I followed up this test by getting a quantity of the blood stain in solution and boiling it in a test tube. Heating caused a deposit of gray flocculi, a mixture of fibrin and albumin. This flocculi was readily dissolved by liquor potassæ, while chlorin, hydrochloric acid or nitric acid caused it to reappear. This is characteristic of a solution of blood.

Another property that my solution had was that a small quantity of liquor ammonia did not change its color, but that heat did. There is no other red solution that will present such a characteristic beside blood.

Lastly, I obtained from the stain, the hæmin crystals. There are easily obtained by digesting for twenty-four hours the scraping of a stain in glacial acetic acid to which has been added a trace of chlorid of sodium. By allowing this red acid solution to evaporate slowly, a great number of crystals appear in the form of rhomboidal plates of a yellowish red or brown color. In a systematic examination of blood, my next one should have been a spectrum analysis of it, but I did not own a micro-spectroscope and as yet have not obtained one.

I proceeded next to the microscopic examination. My first consideration in this examination was how best to bring back the dry blood stains to a solution in which the corpuscles would regain their usual size. Many formulæ were found, for all of which it was asserted that the solution would not increase nor decrease the dimensions of dry blood corpuscles beyond their normal size. I made use of five fluids.

Robin's distilled water with chlorid of sodium, 1 per cent. and bichlorid of mercury one-half of 1 per cent.

Hayem: distilled water with sulphate of sodium, 2½ per cent., pure salt ½ per cent. and bichlorid of mercury ½ per cent.

Richardson: a three-fourths of 1 per cent. chlorid of sodium solution.

Sherman: a 33 per cent. solution of caustic potash.

Glycerin and water mixed in such proportions as to give a specific gravity of 1028. After an extended trial of the various solutions, I discarded all but the last two. With these, I obtained corpuscles perfectly restored and presenting all the appearance of the fresh living cell. The caustic potash solution gave me quick results and fine corpuscles, but after a short time the field would have a multitude of small air bubbles through it, so that I could not study the fields as I wished. I do not know why these bubbles appeared. Prof. J. A. Sewall, in a medico-legal case in which he investigated some blood stains, found the same objection to its use.

The glycerin solution was slow in getting the stain in solution, but beautiful cells were found after a time. It kept some fields in excellent shape for several days. Usually I added some carbolic acid to the water with which I made my glycerin solution.

In making a cover-glass preparation for study, I took a bit of the blood stain from the clothes by gently scraping the stain with a tracing needle and receiving the dust stain upon a glass slide. I then placed a large cover-glass over it and introduced by capillary attraction the fluid destined to separate the corpuscles and restore them to their normal condition.

I first studied the restored corpuscles to get their general characteristics. I found that they were all circular, that all of the corpuscles which appeared fresh were bi-concave disks, that they had a fairly uniform size and a faint yellowish or brownish color. No nucleus was apparent in any cell and in size the corpuscles with a medium power, approached closely that of human blood.

After examining many different stains, I could positively say that not a single oval nor elliptical

corpuscle was present and that not a nucleated cell was to be found. I could now rule out from consideration that part of Ford's statement in which he asserted that these blood stains were stains from "some birds and a snake," as the red corpuscles of both birds and snakes are elliptical, generally large, with a nucleus; while those of man and all mammalia, except the camel tribe, are circular and small.

His statement that the stain might be rabbit's blood was the one that caused me to earn my fee. I had now to measure the corpuscles found in the stain and to compare this measurement with that of human blood. The diameter of the human red blood corpuscle is given by Gulliver, Wormley and Treadwell as 1–3200 of an inch, and that of the rabbit by Gulliver at 1–3607, by Wormley at 1–3653, by Treadwell at 1–3984 of an inch. Assuming that 1–3600 and 1–3700 of an inch is the ordinary range of the size of a rabbit's corpuscle, we would have between such a corpuscle and that of the human blood a difference of fully 1–450 of an inch. With a medium power such a difference could not be easily detected, but with a high power we could magnify the difference, as it were, and thus could easily detect it. This is the secret in the comparison of blood discs.

In the West we have a rabbit that is not common in the East. I refer to the long-eared jack-rabbit. I could find no measurement of its corpuscle. The defense might insist that the blood stain was that of a jack-rabbit, so it had to be considered.

For the sake of comparison, I proceeded next to make permanent mounts of blood. I made a mount of my own blood and in a similar manner made mounts of the blood of the cotton-tail and jack-rabbit. As my working time was short, I was not able to procure live rabbits but bought rabbits which had been killed a few hours previous and took the blood examined, from the cavities of the heart. My method of making these permanent mounts was as follows: films of the blood were spread on cover-glasses in the usual way, and placed while yet moist in a saturated watery solution of mercuric bichlorid for half an hour. At the end of this time the solution was washed away with a ¾ per cent. solution of sodium chlorid. The film was next hardened by immersion for a few minutes in methylated spirit and subsequently in absolute alcohol. Staining with eosine and hematoxylon was then performed in the usual manner. The nuclei of the leucocytes were stained by the logwood, while the red corpuscles were stained entire by the eosine. By this method I made some beautiful mounts which are as good to-day as they were when first made.

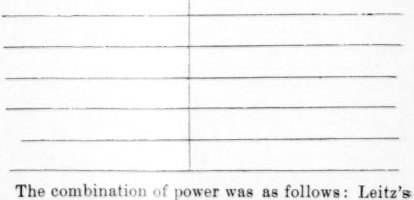
I had now gotten to the place where the measurement of the corpuscles of my permanent mounts and their comparison with the corpuscles found on the clothes was all that remained, provided that I could be sure that my permanent mounts lost nothing by the method employed, and that my solutions employed for restoring the blood stains did all that they were supposed to. The method of making my permanent mounts was first recommended by Dr. Muir in the *Journal of Anatomy* and he asserted that the corpuscles retained their exact shape and size. I measured a number of my corpuscles, both in a fresh state and in my permanent mount and they showed no variation, so I could eliminate the first doubt. As regards the second, I found that by taking a known blood stain, that with my solutions I could restore the corpuscles in it to the exact size that they presented in a fresh state.

The next question was how best to present the matter of measurement of blood corpuscles to an ordinary jury. I decided upon the use of the camera lucida. I was largely guided in this matter by the following extract taken from Carpenter, "The Microscope and Its Revelations," Seventh Edition, page 226:

"It is of the utmost importance to be able with accuracy, and with as much simplicity as possible, to measure the objects or parts of objects that are visible to us through the microscope. The simplest mode of doing this is to project the magnified image of the object by any of the methods described under 'Camera Lucida and Drawing.' If we carefully trace an outline of the image, and then, without disturbing any of the arrangements, remove the object from the stage, and replace it with a 'stage micrometer,' which is simply a slip of thin glass ruled to any desired scale, such as tenths, hundredths, thousandths of an inch and upward. Trace now the projected image of this upon the same paper and the means are at once before us for making a comparison between the object and a *known* scale, both being magnified to the same extent. The amount of magnification in no way affects the problem. Thus if the drawn picture of a certain object exactly fills the interval between the drawing representing the .01 inch, the object measures the .01 inch, and whether we are employing a magnifying power of a hundred or a thousand diameters is not a factor that enters into our determination of the size of the object.

"In favor of this method of micro-measurement, it will be noted: 1, that no extra apparatus is required; 2, that it is extremely simple; and 3, that it is accurate."

I had at my command an Abbe's camera lucida and with a Fasoldt stage micrometer graduated in 1–5000 of an inch, I projected upon paper this scale, using my highest power.



The combination of power was as follows: Leitz's Ia stand, oil immersion objective 1-12, No. v eyepiece, draw tube at 160 m.m.

Having this scale carefully and accurately drawn and proved by several careful observers, it was an easy matter to make any number of such scales by simple measurement and the use of my drawing instruments. Each division of the scale represented 1–5000 of an inch as projected by my combination. By dividing each division up into fifths, I was able to measure 1–25000 of an inch, and not only do it accurately but easily, and demonstrate it to any one.

I now measured twenty corpuscles of the permanent mount of my own blood. The following shows these corpuscles in the scale:

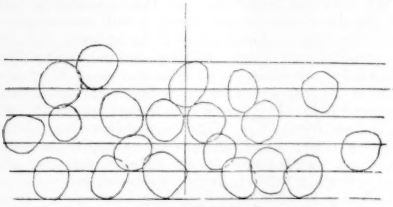
In dividing up the scale and by a careful computation, I found the average diameter of these corpuscles to be 1–3175 of an inch, a little less than the measurement usually given.

Next I measured the cells found in the blood of the jack-rabbit. These cells proved to be very small

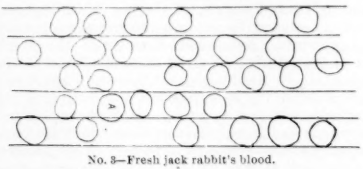
and, as far as I have been able to ascertain, have not been previously measured. Diagram No. 3 shows twenty of these corpuscles. A careful computation of the average size of one hundred of these corpuscles by the camera lucida method gave a diameter of 1-6250 of an inch.

My next step was the measurement of the blood cells found in the blood of the cotton-tail. Diagram No. 4 shows by comparison the size of these cells as compared with those of human blood and blood from the jack-rabbit.

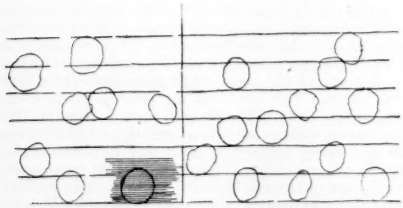
On diagram No. 4, I demonstrate the method of measuring up to 1-70000 of an inch. I do this by simply dividing my 1-5000 scale up into fourteen parts. The corpuscle on this scale occupies eighteen of these parts. It is then 18-70000 of an inch in diameter or 1-3888 of an inch. This corresponds closely to the measurement given by Treadwell. This is but the measurement of one corpuscle. My permanent mount of cotton-tail's blood was not the success that my other mounts had been, as many of the corpuscles appeared to shrink by the treatment given them. Having now accurate diagrams of human blood and of rabbit's blood I was ready for the examination of the blood stains. These I prepared as has been detailed.



No. 2— Human blood.



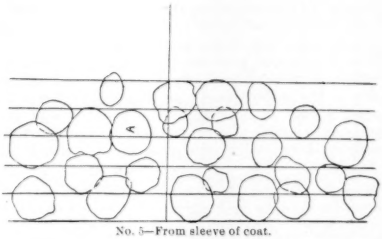
No. 3—Fresh jack rabbit's blood.



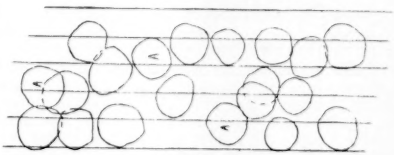
No. 4—Fresh cotton-tail's blood.

Diagram No. 5 shows the outline of the restored corpuscles as taken from the sleeve of Ford's coat. Twenty-five corpuscles are pictured of which eighteen correspond in size and measurement with human blood; seven are below this size.

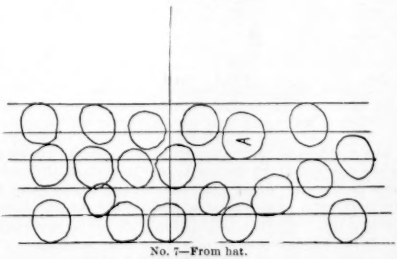
It is surprising what an array of odds and ends can be found in a scraping of a blood stain: bits of cloth-fiber, pieces of fibrin, masses of stain, granular *débris*, broken and twisted cells, bacteria, can be found and must be differentiated from the blood corpuscles. Unless one becomes very familiar with this subject, it is apt to be a perplexing study. Any round flat mass, though it may present irregularities is apt to be a blood disc. If it presents some straw or brown color and a marked different appearance on slight focusing, it is very probably a blood disc. If when the cover-glass is touched with a teasing needle it rolls over and you can get another view of it, you can often be absolutely sure that the mass is a bi-concave disc, a red blood corpuscle. Frequently you will find a cell that is just as clear as a fresh one can be. Such cells should be carefully drawn and designated. Cells A in the accompanying diagrams are such cells.



No. 5—From sleeve of coat.



No. 6—From trousers.



No. 7—From hat.

Diagram No. 6 shows the blood cells from the stains on the leg of Ford's trousers. For some reason these cells were the most perfect ones I found. Any tyro could tell that they were bi-concave discs and any one could have drawn their outline as easily as I did. There is hardly a cell shown that has not the outline of a human red blood disc.

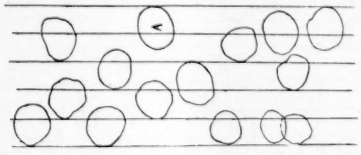
Diagrams Nos. 7, 8 and 9 show the corpuscles found in the stains of the hat, shoe and whipstock, with which he was supposed to have killed the woman.

As can be seen, most of them are of the diameter of the human red blood corpuscles, and but few approach in size those of the rabbit.

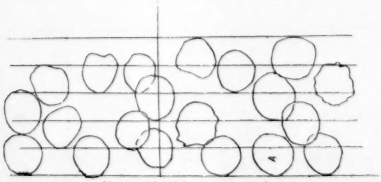
Having my exhibit thus arranged, I reported to the district attorney that the stains found on the clothes were blood stains; that the corpuscles found in those stains were not from the blood of a fish, reptile or bird; that they belonged to the blood of one of the class mammalia and corresponded very closely with those of human blood, and that they did not belong to the blood of the rabbit—neither the cottontail nor the jack.

I was summoned to appear before the court two days later. I intended demonstrating my method of work to the jury and showing them in detail how my results were obtained. When ready to visit the court I received word that my services would not be necessary, as Ford had pleaded guilty and that he had been sentenced by the judge to the penitentiary for life.

Thus my results received quick proof of their accuracy and reliability. By the simplest method known to the microscopist for the measurement of objects, I had settled a knotty problem, and had brought into a case of circumstantial evidence some positive evidence, which the prosecution needed.



No. 8—Blood from shoe.



No. 9—Blood from whipstock.

The method of micro-measurement by the camera lucida has certainly much to commend it in such cases as the one presented. It brings to the jury's eye your own observations, and it throws on them some of the responsibility which by other methods you must share alone.

It puts on paper for subsequent reference more than simple figures. This makes its value in work of this kind very pronounced. In the case just presented, the diagrams of comparison speak stronger than any array of figures. It can be used with accuracy by those who have had no previous experience in work of this kind, and by those who have not and can not obtain the expensive screw micrometer eyepiece.

The method and apparatus is simple and the calculation of the size of objects is easy. To get the diameter of a corpuscle in any direction, one has only to reverse the paper bearing the reading scale. This scale can be either in millimeters or in inches—according to the stage micrometer in use.

With it, one does not have to designate whether his measurement was taken from the outside or inside of the dark border of the corpuscle. A faint light is used, a flat image is thrown in every case and the corpuscle is drawn without shadowy borders.

The method employed in this case is certainly one to be commended in these examinations.

THE TREATMENT OF SMALLPOX PRINCIPALLY BY MEANS OF THE INTERNAL USE OF THE TINCTURE OF THE CHLORID OF IRON.

BY BEDFORD BROWN, M.D.
ALEXANDRIA, VA.

My personal experience in the observation and treatment of variola comprises about one hundred and fifty cases. About sixty of these were seen in the Confederate Army during the late war. The remainder were seen in an epidemic soon after the close of the war, and in an epidemic in this city about the year 1871. Of these cases, at least one-third were of the confluent form. The remainder were of the discrete type. Only about one-fourth of these cases had been vaccinated. In all those vaccinated the type was mild, what is known as varioloid.

In the year 1863, smallpox appeared in the Confederate Army in the department of North Carolina, extending from Petersburg, Va., to Wilmington, N. C., and threatened to assume dangerous proportions, as an epidemic. As medical director of the department at that time, I received from the General commanding, G. W. Smith, plenary powers to apply every means possible for its extinction. A universal system of vaccination was inaugurated throughout the department and re-vaccination in every soldier, when the epidemic was promptly arrested. This much can be said as evidence in behalf of the efficiency of vaccination as a prophylaxis of smallpox.

Of the ninety cases seen after the close of the war one was pregnant, a married woman with three children, all of whom had the disease. This woman was at about the eighth month of pregnancy when attacked and miscarried of a dead fetus when the secondary fever began. The fetus had incipient variolus eruptions on its body. The mother passed through the most severe case of confluent smallpox that I ever saw and finally recovered. She and her three children had never been vaccinated but all recovered. In the case of the mother, for the first three or four days after confinement there was a distinct effort on the part of the breasts at the secretion of milk, but it was soon suppressed. On the contrary, the lochial discharge continued for a period of two weeks in a normal condition.

Influence of Season on the Type of Smallpox.—I have seen cases of smallpox in all seasons of the year. In the dead of winter when the earth was covered with snow, and the temperature below zero, and again in the soft season of spring, in the torrid heat of July and in autumn and winter. I am really not aware that the type is affected in any way by these influences. I have seen confluent cases in the intense cold of January, and in July when the temperature was 96 degrees, pass through the stages safely. I have attended smallpox in both country and city practice, and I am constrained to believe that in the aggregate the type of smallpox in the unvaccinated

among country residents is milder than in city denizens. That is, there is a decidedly greater proportion of discrete cases among the former than the latter.

In the epidemic alluded to, which occurred in the spring just after the close of the war, in a southern village of some twelve hundred population, smallpox appeared in May; was contracted by the negro population just then liberated and the infection was spread throughout the surrounding country. There were hundreds of cases of the disease among this population, and probably not one in a hundred had ever been vaccinated. Yet not one-third of the cases were confluent, and a fatal termination was a rare occurrence.

This fact would indicate that the type of smallpox is favorably modified by pure fresh country air, free from overcrowding and the septic influences of a city atmosphere.

Inoculation with Smallpox Virus.—During this epidemic there were eight or ten persons who had been exposed to the infection of smallpox, accidentally, several days before they discovered their danger. Neither of these persons had been vaccinated and at that time it was too late for vaccination to afford them protection against infection. As they were very solicitous to be saved from an attack of smallpox, I determined to inoculate them with genuine smallpox virus taken direct from the pustule. They all assembled at the house of the smallpox cases and were inoculated directly from the pustules. They all did remarkably well. Every case proved to be a mild type of the discrete form.

Treatment.—The mild discrete form of smallpox needs but little treatment except cleanliness and careful nursing. An occasional aperient, soap and water to the inflamed skin and proper diet.

On the contrary, the confluent and more malignant forms of the disease, in my experience require active and energetic treatment from an early period, and the treatment in this form may be divided into the local and general, the antiseptic and sustaining. The pathologic condition of the system in the confluent variety would appear to be very analogous to that in which there is an enormous internal abscess filled with infectious matter which is constantly being absorbed into the circulation, causing genuine septicemia or pyemia.

When pus begins to form in the pustules of confluent smallpox, the secondary fever begins and not before. While the pustule contains pus, the primary fever which produces the pustules, or rather accompanies its development, when the pustule is fully developed suddenly subsides, and then ensues a period of apyrexia or rest. But when pus begins to collect, the whole phase of the case is promptly changed, and there are developed symptoms in rapid succession of septicemia or pyemia. This secondary fever must be accepted as a measure of the extent of blood poisoning.

The entire surface in confluent smallpox is denuded of its cuticle and is surrounded with a layer of poisonous pus, is literally bathed in pus for days, from which there is constant absorption of poisonous material.

From my earliest acquaintance with this disease, I was impressed with the fact that to counteract this condition of blood-poisoning, there were two classes of remedial agents necessary; the one sustaining, the other antiseptic.

General Treatment.—I do not know any better general remedy to counteract the effects of septicemia or pyemia than the old-fashioned tincture of the chlorid of iron. I so regarded it more than thirty years ago, when I witnessed the first cases of this disease, and then resorted to it freely. I published soon after the war, my experience with it in an article in the *American Journal of Medical Sciences*, and I have used the remedy in every case of confluent smallpox since, with the best results.

I begin the remedy in every case of the confluent form, from an early stage of the disease, previous to the appearance of the septicemic or secondary fever, and maintain it to the end. Twenty drops of the agent in a little water and glycerin is given every three hours. In addition to this, about 10 grains of quinin are given a day. In all bad cases, I give stimulants in the form of milk punch or egg-nog, and nourishing broths.

Local or Antiseptic Treatment.—My experience with antiseptic treatment convinces me that its value can not be overestimated. This can only be applied locally to the diseased surface.

In my first cases, I used chlorin water, the liq. chlori., diluted with water. The entire surface was bathed every three or four hours. The effect of this antiseptic bath administered at short intervals was excellent. Every pustule on the face should be split open with two incisions, crossing each other, with a delicate knife, the pus gently pressed out and the cavities subjected to an antiseptic, by bathing with either the liq. chlori., or a solution of permanganate of potash, two grains to the ounce.

This local antiseptic treatment will go far to prevent pitting. The case of the woman who aborted with confluent smallpox, alluded to above, was subjected to this chlorin treatment and she escaped without a pit. In addition to the chlorin and permanganate treatment, I should be tempted, now, in cases of this kind, as a further antiseptic measure, to resort to an ointment composed of ichthyol, aristol and europhen, to be applied over the entire surface after bathing with chlorin water. The mortality under this practice has been exceedingly small, not more than 3 per cent.

Believing as I do, that all the indications point to the secondary stage of smallpox as the period of danger, and that the danger of that stage lies in the presence of an enormous quantity of infectious pus being constantly absorbed, and acting on the blood of the patient as an infectious poison, I have, acting on this principle always treated smallpox as I would any other case of septicemia or pyemia arising from infectious causes, and the results have been satisfactory. The pustules on the skin constitute the local lesion which furnishes the septic poison, and while we sustain the vital powers of the general system, we must at the same time, be busily at work in disinfecting the local lesions, the source of the poison.

SERUM-THERAPY—STATISTICS UPON THE USE OF THE DIPHTHERIA ANTITOXIN.

BY G. C. CRANDALL, B.S., M.D.
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In following the abundant literature which has appeared during the past year upon serum-therapy, we find that the interest of the profession has been

gradually aroused, and with the many investigators in the field we may trust that the question will be fairly examined with every means and method at our command.

Before the discovery of the germ causation of disease, it was known that an attack of certain diseases effected a longer or shorter natural immunity against those diseases; and in more recent times since the germs of certain diseases have been isolated and cultivated, those best acquainted with theoretical and practical bacteriology have entertained favorable views concerning the possibility of artificially producing immunity against the diseases caused by certain germs.

In some diseases immunity can be established by the use of a modified, less virulent form of the germ, but this is not sufficient; more desirable is an immunity and therapeutic action which can be effected without the introduction into the human system of even the modified germ. For these purposes various investigators are experimenting with the so-called toxins, antitoxins and nucleins.

The present knowledge of physiologic chemistry is inadequate to fully explain the physiologic origin and action of these new elements, but it suggests the way, and many are now diligently searching for such anti-disease remedies, which may prove to be more worthy the name of specifics than any so-called drugs of the pharmacopœia.

The first of these remedies which has gained at least a temporary recognition by the profession, is Behring's diphtheria antitoxin. Having recently had access to the Library of the Royal College of Surgeons of England, I gathered as fully as possible, statistics upon the use of the anti-diphtheritic serum.

The following table includes most of the serum treated cases which have been reported. The results of some of the most extensive observations are given separately:

		No. Cases treated with serum.	Mortality in per cent.	Previous Mortality in per cent.
Vierordt	Heidelberg	55	14.6	58.0
Ganghofner	Prague	110	12.7	50.0
Wiederhofer	Vienna	100	25.3	42.8
Kossel	Berlin	350	16.7	34.7
Baginsky (quoted by Virchow)	Berlin	303	13.2	47.8
Sonnenburg	Berlin	107	20.6	27.6
Aronson	Berlin	190	14.0	37.0
Ranke	Munich	85	18.8	48.5
Saltmann	Leipsic	192	18.0	
Risel	Halle	114	8.0	
Roux, Martin and Chaillou	Paris	300	26.0	51.7
Lebreton	Paris	258	12.0	
Moizard	Paris	231	14.7	50.0
Washbourn, Goodall, Card and others	London	195	18.6	31.1
White	New York	32	25.0	42.7
Withington	Boston	80	16.0	45.0
Total number of cases		2,632		
Average mortality per cent.			16.8	
Previous average mortality per cent.				42.0
Collective report of other observers in different countries		4,022	17.1	

The above table shows a much lower mortality than has ever been generally attainable under former methods of treatment. Those who have used the remedy most extensively, report that the incidental action of the serum seems to be due to avoidable impurities and to the idiosyncrasy of the patient; also that paralysis, albuminuria, lung complications and necessities for operative procedures occur less frequently than under previous methods.

The relatively inexact method of determining the strength of the serum has been a barrier in the way of exact dosage. If the chemist can separate the antitoxin element in a stable form, the dosage may be made more accurate, the administration simplified, and incidental action may be less frequently observed.

With the experience of the past year as a guide, the investigators hope to be able to show greater evidences of the value of serum-therapy. At the Pasteur Institute in Paris, experiments analogous to those with diphtheria, are being made with the virulent streptococci which cause certain severe, acute, inflammatory, suppurative conditions. A horse has been rendered immune against virulent cultures of the streptococci, and its serum is being used with suitable patients.

Dr. Paquin of St. Louis, is meeting with favorable results in his systematic experiments with tubercular antitoxin, and we shall anxiously await further reports upon his work.

Whatever may be our prejudices for or against serum-therapy, we should assist or at least encourage the investigators, and patiently await the development of such facts as will prove the question at issue.

PROFESSOR SENN'S NOVEL PLASTIC REPAIR OF CONTRACTURE.

BY MAJOR A. C. GIRARD, SURGEON U. S. ARMY.
FT. SHERIDAN, ILL.

The following ingenious method devised by Professor Senn in his clinic at Rush Medical College, to replace scar tissue by sound skin, is well worthy of general notice. Without going into the history of operations tending to repair defects I will at once proceed to a description of the case:

Contractured fingers.

A child about 3 years old had been burned in the left hand some four months before, to such a degree that the cicatrization bound down and flexed the thumb and little finger in an absolutely useless and immovable position. The little finger was liberated by excision of the tendinous bands with comparative facility. To do the same with the thumb would leave a large raw surface. A flap from the anterior chest wall with fixation of the arm, was not feasible, owing to the tender age and consequent lack of co-operation of the child. A flap from the forearm twisted and turned into the palm of the hand, would probably become necrotic and leave matters in a worse shape. Skin grafting would not prevent contracture, and skin transplantation could not be thought of, on account of the lessened vitality of the tissues adjoining the defect.

After much deliberation, Professor Senn determined on a novel method by dissecting off a flap from the dorsum of the hand, adjoining the thumb, leaving both ends of the flap attached, and slipping it over the thumb into the place vacated by the excised scar.

A.—Volar side with flap in place. Dorsal side with outlines of flap.
B.—Grafted triangle.

An incision was started from the base of the first finger, carried obliquely upward to near the base of the metacarpal of the thumb; the second incision was parallel to this, about one inch toward the middle finger. The flap was carefully dissected off, preserving the subcutaneous veins. The doubt as to the possibility of slipping it over the bent thumb was soon removed by the ease with which it was made to assume its new place, where it was anchored by two rows of interrupted sutures. A small triangular defect between the flap and the base of the little finger was filled by Thiersch's grafts. The dorsal wound was easily united by interrupted sutures and the usual splint and dressings applied.

At the clinic, a week later, the child was exhibited; the flap had united *per primam*, the grafts adhered, the dorsal wound was closed and the thumb in its proper place. The prospect of permanent cure of the contracture was assured.

ENEMATA OF WHITES OF EGGS. MEMORANDUM.

BY JOHN ASHBURTON CUTTER, M.D.
NEW YORK.

Albumen of eggs is valuable to feed patients when other forms of nourishment can not be taken or to reinforce other nourishment. I have known patients to take the whites of eighteen eggs in one day with evident advantage, in some cases the result appearing almost life-saving.

Exhibition by the mouth is made in three ways: 1, raw; 2, raw with milk; 3, dropped in boiling water and slightly cooked.

Enemata of uncooked whites I have lately used with decided benefit. Administration by a Davidson hard rubber syringe No. 494, one ounce. Eggs vary in size and weight and should be sold by weight; the albumen of an egg varies in bulk from one-half to one ounce as eggs run.

Drugs can be administered with the raw albumen; sometimes a little laudanum is needed, but rarely, to quiet bowel. Patients state that an enema relieves the faint gone feeling in stomach, and such relief is longer than when the whites are administered by the stomach.

Equitable Building, New York.

PERITONEAL SUPPORTS—(LIGAMENTUM PERITONEI).

BY BYRON ROBINSON.
PROFESSOR OF GYNECOLOGY POST-GRADUATE SCHOOL, CHICAGO.

(*Continued from page 110.*)

The splenic artery perhaps throws more light on the disposition of the mesogaster than do the gastric and hepatic arteries. The splenic artery arises from the celiac axis and passes at first, slightly downward and then toward the left along the upper border of the pancreas. It is a large spiral artery, but does not project the peritoneum into a very prominent fold, yet the outline of the fold is especially prominent in those animals in which the omentum and transverse colon do not have contact relations, especially at the left end. The prominent feature of the splenic artery in regard to the mesogaster is that the artery in its course lies to the left of the right blade of the mesogaster until it suddenly turns upward to gain access

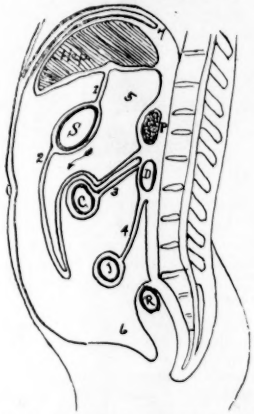

Fig. 22 is copied from the excellent anatomy of Prof. Gegenbaur (1884 German edition). It is chiefly to represent the views of an eminent comparative anatomist as regards the transverse colon and omentum. It may be observed that his idea is that of coalescence, for his mesocolon transversum consists of four layers (No. 3). 1, gastro-hepatic omentum; 5, lesser omental cavity; *p*, pancreas; 3, mesocolon transversum; 4, mesenterium; *d*, duodenum; *c*, colon; 2, anterior layers of great omentum; *r*, rectum; 6, great omental cavity; 7, reflections of coronary ligament; *j*, intestine. However, Gegenbaur mentions in his text-book the displacement theory without committing himself to it.

to the space between the blades of the ligamentum gastro-lienalis, but the other equally important feature is that the splenic artery for all its straight horizontal course lies against the posterior abdominal wall, *i. e.*, it does not lie against the left blade of the mesogaster, for that blade has by developmental processes been re-adjusted, displaced, or as some would argue, coalesced. In the process by which the liver forced the stomach to the left and downward and gave origin to the elongated mesogaster and lesser omental bag, the left blade of the mesogaster has been displaced to the left, hence the left and posterior surface of the splenic artery is without a serous cavity for the most of its trunk, or until it turns upward into the gastro-splenic ligament. The splenic artery being devoid of its serous covering for the length of the chief trunk, on the left side reveals

a developmental process in the original process of formation of the mesogastrium posticum or great omentum. This bearing of the splenic artery gives an actual demonstration that the left blade of the mesogaster is displaced to the left by some force. In fact, the left blade is displaced several inches or more to the left of its original insertion.

The process of re-adjustment, displacement (or even coalescence) is in accord with the previous assertion that serous cavities and their walls are nowhere primary, but always a secondary process which

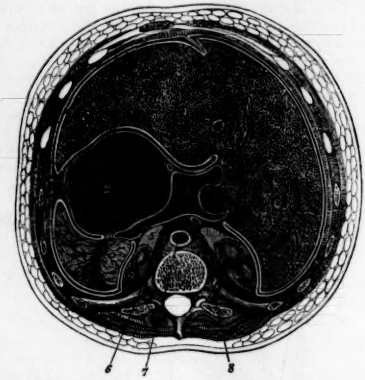

Fig. 25 (after Luschka, 1863) is a beautiful and accurate transverse cut at the level of the twelfth dorsal vertebra. This figure corresponds more exactly with my own dissections as regards the splenic relations of the peritoneum than any known to me. 1, liver; 2, stomach; 3, spleen; 4, kidney; 5, adrenal; 6, diaphragm; 7, thoracic aorta; 8, inferior vena cava; 9, cavity of the lesser omentum. Observe that there are two points where the spleen is uncovered by peritoneum, i.e., a strip at its hilus and a strip at its posterior border, e.g., near the adrenal at No. 5. This elegant and natural cut was also adopted by Dr. Bochdaleck, Jr., in 1867, as a natural model.

is very active up to the sixth fetal month. Now, as the developmental process is the only key to the adult condition, we can only expect to understand the origin and formation of the great omentum by sticking close to the evolutionary processes in ani-

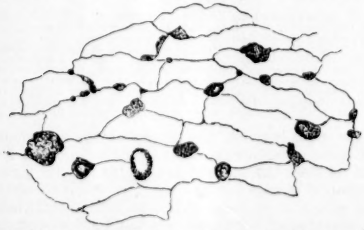

Fig. 26 (after Toldt, 1879) is introduced to show the shape of the epithelium which covers the surfaces of the mesentery. It is taken from the surface of the great omentum of a six weeks old child. It is magnified by Hartnack's system, xi ocul. 3.

mals. Man's embryo passes through all lower mammalian stages, but the transitions are so rapid and complicated that it is almost impossible with limited material to establish consecutive and logical facts in regard to such a delicate structure as the great omentum. However, in animals we find the evolutionary stages permanent in some animals, not reached in others and in still a few stages just approaching that of man. So that the thread of development can be demonstrated by investigations in embryologic and mammalian life, far below man in structure.

In one series of fifty autopsies, I recorded the position of the omentum in regard to the cecum and found the omentum covered the cecum in about eight cases. This is significant, as the omentum is a highly important organ in an inflammatory peritonitic district like the appendicular. The omentum when it lies out of its normal position is apt to be rolled up behind the transverse colon. This, I think, is due to the emptying and filling of the colon with gas and feces. It may also be due to an occasional sudden filling and emptying of the small intestine with gas

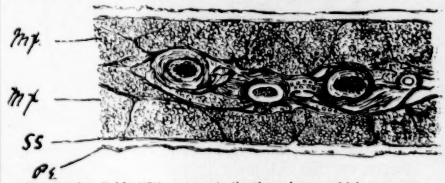

Fig. 27 (after Toldt, 1879) represents the three layers which compose a mesentery: *m p*, membrana propria mesenterii, i.e., the real neurovascular visceral pedicle: *s s*, subserosa; *p p*, peritoneal layers of epithelium. It is drawn from a cross section of the middle portion of the mesenterium of a four year old boy. Enlarged seventeen times.

by acute indigestion, from disproportionate secretions and consequent fermentation. In some autopsies it was evident that the great omentum had been rolled up behind the transverse colon for some time, for it was fastened there by peritonitic bands. Also it seemed to become rolled up behind the colon by a slow gradual process. It is not a suddenly acquired position. The omentum was found rolled up over the colon some six to eight times in one hundred cases. The chief rolling is accomplished near the flexura coli lienalis, but in one case in a series of fifty autop-

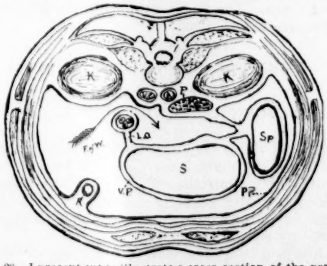

Fig. 28. I present cut to illustrate a cross section of the peritoneal cavity at a level of Winslow's foramen. *P p*, parietal peritoneum; *v p*, visceral peritoneum. stomach; *R*, round ligament of the liver; *L o*, lesser omentum; *P*, pancreas; *V*, vena cava; *A*, aorta; *K*, kidney, *F of W*, foramen of Winslow (the arrow points to lesser cavity of omentum). By this figure it will be noted that the spleen is uncovered in two strips, viz.: hilus and strip on posterior border.

sies, I noticed that it was definitely rolled up over the flexura coli hepatis; however, old peritonitis existed in this case. No doubt the position of the omentum is due to peculiar contractions and dilatations of the bowel, due to gases and feces and also to local peritonitis. In the case of the cecum, whenever very severe inflammations had existed in that region, the omentum was fastened there, but I noted with care that as a rule the omentum did not cover the cecum, but was no doubt displaced from the cecum by its

frequent contraction and distension by gases. It was common to find the lower edge of the omentum in all positions between the floor of the pelvis and the transverse colon, but generally ascending or shortening mainly along the left side. The contraction and distension by gas of a long large sigmoid no doubt aids in forcing the omentum upward. It does not appear from autopsies that repeated pregnancies induce the great omentum to enlarge and roll up.

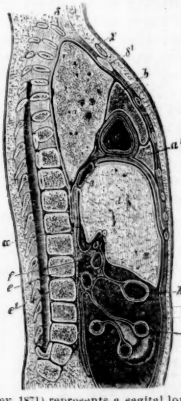

Fig. 29 (after Abey, 1871) represents a sagital longitudinal section of the body of a new-born near its middle line. It is one-half natural size, and shows the left cut surface. *a*, lung; *c*, heart; *b*, thymus gland; *a* 1, lower lobe of right lung; *d*, liver; *h*, inferior vena cava; *g*, lesser omental cavity; *f*, pancreas; *e*, upper and *e* 1 lower cross section of duodenum; *g*, small intestine; *i*, colon transversum. Observe how its liver and vena cava divide folds of peritoneum. The peritoneal line is white.

Fig. 30 (after Abey, 1871) is another fine cut from the excellent Swiss anatomist. It is a longitudinal section of a new-born, showing the right cut surface, one-half natural size. *a*, upper and *a* 1 lower lobe of left lung; *b*, heart; *c*, stomach; *d*, liver, with ligamentum phrenico-hepaticum; *e*, adrenal; *f*, pancreas; *g*, kidney; *h*, colon transversum; *i-i*, iliac and bursa omentalis and ilium. Notice Abey accepts the coalescence view of the union of the omentum and transverse mesocolon by the representation of four layers of peritoneum between the colon and dorsal wall.

Neither is it always connected with local inflammation. Yet it is often associated with local peritonitis. No doubt the chief causes which induce the

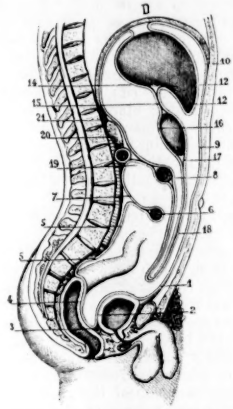

Fig. 31 (after Sappey, 1889) is a cut excellent for its simplicity. It is quite diagrammatic. It shows a vertical section of the serous cavity of the abdomen. 1, parietal peritoneum just before it passes over the bladder; 2, visceral peritoneum covering bladder; 3, recto-vesicle fossa (excavatio recto vesicæ[is or Douglass' pouch]); 4, envelope of the rectum; 5, the beginning of the meso-sigmoido mesenterium; 6, mesenterium surrounding the small intestine; 7, superior blade of mesentery; 8, continuation (into omentum) of superior blade of mesocolon; 9, anterior abdominal parietal peritoneum; 10, peritoneum covering diaphragm; 12, peritoneum covering under surface of liver; 13, peritoneum covering posterior under surface of liver and forming superior lining of lesser omental cavity; 15, gastro-hepatic omentum; 16, superior blade of lesser omentum covering posterior surface of stomach; 17, union of anterior and posterior blades which inclose the stomach (gastro-colic omentum); 18, great omentum (anterior and posterior blades or descending and ascending folds); 19, mesocolon transversum; 20, pancreas; 21, a continuation upward over the pancreas of the superior blade of the transverse mesocolon.

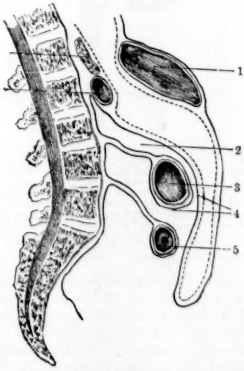

Fig. 32 (after Cruveilhier). This cut represents the method of coalescence of the superior blade of the mesocolon transversum with the posterior (under) ascending blade of the ascending fold of the great omentum. The figure is to illustrate how the cavity 2 (recessus peritonei) becomes obliterated by coalescence, i.e., the two layers of the peritoneum forming the pocket (2) unite their surfaces as far as indicated by the figures 4, 4. The three layers of peritoneum above the inferior blade of the mesocolon transversum coalesce, by loss of endothelium, to one blade, making the superior blade of the mesocolon transversum. This theory of coalescence is approved throughout in the labors of this work. The view I hold is that the membrane or peritoneal layers forming the cavity (2) marked 2 is gradually displaced or dragged out, which would leave the dotted line which ascends over the pancreas as the superior blade of the mesocolon transversum. 1, stomach; 3, colon transversum; 5, intestine; 2, the recessus peritonei, peritoneal pocket; 4, indicates the point to which the two peritoneal blades coalesce. The dog or cat are good examples to observe the displacement or readjustment of the peritoneum. The white lines found along the meso-sigmoid and descending colon are evidences, I think, of displacement of the serous layers, and not of coalescence.

great omentum to ascend and roll up are: (*a*), distension and contraction of the bowels by gas or feces; (*b*), local peritonitis. The bowels essentially concerned in displacing the omentum appear to me from autopsies to be (*a*), transverse colon; (*b*), cecum; (*c*), sigmoid flexure; (*d*), small bowels; and (*e*), a few cases of peculiar bladder distension. So far as I can see, the chief use of the great omentum is to prevent the invasion of infection, and hence the main effect of its displacement will be to allow inflammation to cause adhesions in localities where its presence would have prevented it. However, the use of the omentum will be discussed in the department of physiology. It does not appear that bodily position particularly induces the displacement of the great omentum, for in dogs whose bodily position is quite different from that of man, I never once found the omentum rolled up toward the diaphragm. But a dog has no real transverse colon, cecum or sigmoid flexure as man has. A displaced great omentum is one abnormally fixed, whether it be by peritonitic adhesions or peritoneal fossa due to loops.

The normal position of the great omentum is outlined by the left border of the esophagus, greater curvature of the stomach, a portion of the duodenum, and occasionally the outline passes down the ascending colon for a variable distance (in some fetuses it extended to the cecum). This constitutes the upper outline of the insertion of the great omentum as seen on opening the abdomen. The lower outline will be the lateral walls of the abdomen, the floor of the two iliac fossa and the pelvic floor. With a large, fat, thick and stiff omentum the above outline may be followed mathematically. The outline of the insertion of the great omentum as regards the colon is from the ligamentum-phrenico-colicum on the left costal wall along the transverse colon to the flexura hepatis, and frequently the omental insertion extends a variable distance down the ascending colon. This part of the great omentum (right lower border) is known as omentum colicum Halleri. This outline can be traced by lifting up the great omentum and following the base line of insertion along the colon transversum. In fetal life, childhood and in some early adolescent life, one can separate the layers of the great omentum. The same view holds in dogs.

Fig. 33 (Gray, 1877) represents the shape and outline of the lesser omental cavity (bursa omentalis). It is diagrammatic. The lesser omental cavity I have divided into two cavities, greater and smaller. Winslow's foramen leads into the smaller right cavity, which contains Spigel's lobe of the liver (a viscus). Huschke's foramen leads into the great cavity which lies behind the stomach and contains no viscus. I named this foramen after Huschke because he was the first, so far as I am aware, to describe it, and I also consider Huschke's description of the peritoneum in 1844 as the first and most scientific description of the peritoneum. Either or both Winslow's and Huschke's foramen may become closed by inflammation.

Perhaps one of the best methods to make the outline of the insertion of the great omentum clearly visible is to force air through Winslow's foramen, but in such cases it must not be forgotten that old peritonitis may have constricted off considerable of the lesser omental sac, thus disturbing the original anatomic line of insertion.

Now as regards the names which should be applied to the different parts of the great omentum or mesogaster posterior; they should be natural and indicate their office and location. I shall attempt to describe parts of the mesogaster under such appropriate names. It is absolutely necessary to have names for parts and localities of such a long, pendulous, wide fold as the mesogaster or great omentum. In order to follow a simple plan with simple names, we will begin at the left border of the esophagus and follow the great omentum to the right lower border of the omentum colicum Halleri. The first part which we will name is the ligamentum phrenico-esophageus, a thick dense fold of peritoneum reaching from the diaphragm to the left border of the esophageus and as far down as the cardiac end of the stomach. Some of the fibers of this peritoneal duplicature pass from the diaphragm to the upper cardiac end of the stomach. This band consists of two fine epithelial or serous layers indorsing a white connective tissue collection which appropriately may be compared to the mesenterii membrana propria. Its milk-white color is due to accumulations of connective tissue. The ligamentum phrenico-esophageus is entirely analogous to what I have termed the pars tendinous ligamentum gastro-hepaticum. The ligamentum phrenico-esophagus is a triangular fold of peritoneum containing considerable white fibrous tissue between its layers. It gives much substantial support to the stomach and esophagus. It generally reaches to the cardiac end of the stomach. It is the most dense part of the whole great omentum. Some authors have named this band ligamentum gastro-phrenicum, but I prefer the name above given. The ligamentum gastro-esophageus is not inclined to fat any more frequently than the pars tendineus of the ligamentum gastro-hepaticum.

BETWEEN RECTUM AND UTERUS
BETWEEN SACRUM AND RECTUM
BETWEEN SMALL INTESTINE AND PELVIC VISCERA
BETWEEN TRANSVERSE COLON AND SMALL INTESTINE
PROCESS BETWEEN DIAPHRAGM AND LIVER
BETWEEN LIVER AND STOMACH
BETWEEN UTERUS AND BLADDER
GREAT OMENTUM

Fig. 34 (Gray, 1887) is to represent the greater cavity of the peritoneum; quite diagrammatic.

The next portion of the great omentum is a double-

bladed band of peritoneum which extends from the greater curvature of the stomach to the hiatus of the spleen, and then intimately surrounds the spleen, blending with its capsule. The band is known as the ligamentum gastro-lienalis or gastro-splenic ligament. The peculiarity of the splenic ligament is that the part passing to the body of the spleen is intimately and closely blended with the organ. In fact, the peritoneum and splenic capsule coalesce. The ligamentum gastro-lienalis has the vasa brevia lying between its blades and a short part of the distal part of the arteria lienalis. The reason of this is that the main trunk of the splenic artery, three-fourths, lies behind the posterior blade of the lesser omental sac until a short distance from the spleen, when it suddenly turns upward to gain access to the space between the layers of the gastro-splenic ligament when the arteria lienalis is conducted to the spleen. In fetal life the ligamentum gastro-lienalis can not be said to possess any length as the spleen develops close against the stomach, but in the progress of development the spleen travels more and more toward the left until it lies in contact with the costal wall. The splenic ligament elongates rapidly after the sixth fetal month. There is considerable connective tissue lying between the blades of the gastro-splenic ligament beside five to seven arteria lienalis. This duplicature of peritoneum is of considerable strength, inclined to fat accumulation and frequently subject to local peritonitis.

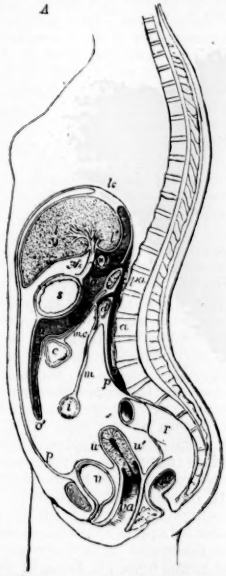

Fig. 35 (after A. Thomson, 1882) represents a sagital longitudinal section of the peritoneal cavity. It is an excellent figure. The author of the cut adopted the theory of peritoneal coalescence, as may be noted in the four layers of the mesocolon transversum in the drawing. The section is intended to be in the median line of the body. *l c*, is placed above the diaphragm opposite to the coronary ligament of the liver; *l*, liver; *11*, Spigel's lobe projecting into the right end of the lesser omental cavity; *s*, stomach; *c*, transverse colon peculiarly drawn to suit the theory of coalescence; *i*, small intestine; *p a*, pancreas covered by serous epithelium only in front; *a*, aorta; *d*, duodenum covered by serous epithelium only in front; *u*, urinary bladder covered only its upper part by serous epithelium, but surrounded by a bed of sub-peritoneal tissue; *u*, uterus; *r*, rectum; *r 1*, its lower part, with a portion of its lateral wall cut away; *v a*, vagina; *p p*, the parietal peritoneum lining the abdominal wall. The line representing the reflections of the greater sac of the peritoneum can be traced from the coronary ligament at *l c*, where it passes from the diaphragm to the upper surface of the liver, over the upper and under surfaces of that organ to the gastro-hepatic omentum, *g h*; it continues on to the front of the stomach down to *o 1*, which is the anterior or descending double-bladed layer of the great omentum; thence it reflects on itself and passes to the vicinity of the pancreas, *p a*, whence by displacement or being drawn out the colon transversum (*c*) becomes located between its blades (not by coalescence as indicated in the drawing). The lower blade of the mesocolon transversum, *m c*, now proceeds to the root of the mesenterium, *m*, where it envelopes the small intestines, producing the mesenterium and curves at the root, again making the left (under) blade of the mesentery. The membrane thence passes over the rectum, *r*, descends into the pelvis and covers a small portion of the posterior wall of the vagina, *v a*, the whole of the posterior surface of the uterus, *u*, and the anterior surface of the uterus, *u*, as far down as its internal os, hence the membrane passes over the bladder, covering only the dome of the organ, thence to the anterior abdominal wall, *p*, to the ligamentum coronarium hepatis to the point of beginning. The figure in cut just to the right of the median line, therefore shows the foramen of Winslow, *W*, as an aperture. The lesser omental cavity is shaded dark and shows Spigel's lobe, *l 1*, projecting into its right and upper cavity indicated by *o o*. From *l c*, the layer of peritoneum lining the cavity can be easily traced from *l c* to *o 1*. Of course both cavities are really one, and Winslow's foramen is only a constriction of the whole bag placed nearer one extremity than the other, i.e., the constriction represents an unequal hour glass, 1.

The next short band belonging to the spleen and a part of the mesogaster is the ligamentum phrenico-lienalis. This band of peritoneum extends from the diaphragm to the spleen. The part of this ligament which is in contact with the spleen intimately blends with its capsule. As the band passes from the diaphragm to the spleen, it returns from the posterior surface of the spleen in such a manner that it leaves a small strip of the posterior border of the spleen uncovered. So that the gastric, splenic and phrenico-splenic ligaments which both cover the spleen leave a strip of the spleen uncovered at the hilus where the vessels and nerves pass in and out, and also a small strip of spleen uncovered on its posterior border. This I have carefully investigated personally and think, though disputed by some authors, it represents the true state of matters in regard to the splenic ligaments. The ligamentum phrenico-lienalis is a strong, whitish, dense fold of peritoneum which reaches from the top of the spleen to nearly its lower pole. It falls short of the full length of the spleen on account of the ligamentum reno-lienalis, a short duplicature of peritoneum reaching from the spleen to the kidney. This ligament is not always the same

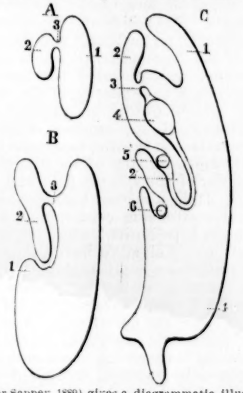

Fig. 36 (after Sappey, 1889) gives a diagrammatic illustration of the development of the peritoneal cavities. *A*, shows the beginning of the two cavities; 1, great omental cavity; 2, lesser omental cavity; 3, Winslow's foramen. *B*, shows the elongation and invagination of the smaller cavity (2); 1, great omental cavity; 2, lesser omental cavity; 3, foramen epiploon. *C*, shows a vertical section of both peritoneal cavities.

in every individual on account of the varied position of the spleen and kidney. Hence, authors dispute in regard to its complicated relations, as there is no doubt that in certain bodies occasionally there exists a portion of spleen uncovered between the upper pole of the kidney and the lower pole of the spleen. The cut that accords with my investigations is that of Prof. Hubert Luschka in regard to the splenic relations to its ligaments.

The next lower portion of the mesogaster which deserves a name, and over which volumes have been written, is what I shall term the ligamentum phrenico-colicum. The synonyms of this ligament are, ligamentum costo-colicum, or pleuro-colicum. This ligament is the lower left border of the great omentum, *i. e.*, a continuation of the mesogaster from the flexura coli lienalis on to the surface of the diaphragm. The ligamentum phrenico-colicum serves as a support for the spleen. It is an extension of the last acquired relations of the transverse colon and great omentum. It is composed of four layers, and often in the left recesses of the ligamentum phrenico-colicum there exists constricted off sacs, closed or unclosed, due to local peritonitis. The position of the spleen no doubt frequently depends on the length and strength of this ligament. If the ligament be normal the spleen rests on it in a normal height, but if the ligament elongates it gives origin to wandering of the spleen. The ligamentum phrenico-colicum extends from the greater curvature of the stomach and transverse colon to the surface of the diaphragm on the left costal wall. Its width consists of the distance between the lower border of the splenic pole and the transverse colon. It is a strong ligament composed of four blades of peritoneum containing some connective tissue fibers between its blades. In the region of this ligament nearly all adult bodies show local peritonitis. It produces a sharp angle (flexura coli lienalis) at the junction of the descending and transverse colons, by dragging this portion of the bowel well upward toward the costal wall. No doubt much of the local peritonitis existing around the spleen is due to wandering through the bowel wall of microbes or their products by reason of trauma of the micosa from sharp foreign bodies passing around the acute angle.

The next portion of the mesogaster entitled to a distinct name is the ligamentum gastro-colicum over which men have disputed for centuries. The gastro-colic ligament is a double-bladed fold of peritoneum extending from the greater curvature of the stomach to the transverse colon. The ligament acquired its relations with the transverse colon during fetal life, gradually from right to left, beginning in the second month. Its origin is due to the intimate relation of the right end of the large bowel with the duodenum and mosoduodenum. It consists of two layers which afford a bed for the gastric arteries, epiploica dextra and sinistra. Its posterior blade forms the anterior wall of the lesser omental bag and its anterior blade is next to the parietal peritoneum anterior. Its left end extends to the costal wall and merges into the ligamentum phrenico-colicum.

How does the posterior border of the spleen become uncovered by peritoneum? I examined quite a number of fetuses and adults in order to convince myself of the process. In an early fetus it is easy to trace the posterior mesogaster to its insertion in the mid-dorsal line. In adults one can not do it very easily, if at all. in most adult cadavers. This is because the left blade of the mesogaster during the leftward shifting of the stomach, is displaced or shifted toward the left of the vertebral column. The fold of peritoneum which forms the left blade of the mesogaster meeting the fold of peritoneum which crosses the dorsal wall at the root of the mesogaster simply withdraws itself toward the left. Considerable of the root of the left mesogastric blade is pushed from its original mid-dorsal insertion by the leftward moving great stomach curve. This leaves only the right root of the blade of the mesogaster inserted in its original mid-dorsal line. This process forces the blades of the mesogaster at the root apart. The separating process of the mesogaster at its origin continually proceeds until a small strip of the spleen becomes uncovered at its posterior border. The force which separates the blades of the mesogaster at its base and exposes a narrow strip of the posterior border of the spleen is analogous to the separation of the blades of the mesogaster in exposing a part of the pancreas in its middle portion, for the tail and head of the pancreas may still remain in the mesoduodenum and gastro-colic omentum, while its body or middle portion may be entirely out of the meso-colon, *i. e.*, a retro-peritoneal organ so far as the epithelial layer of the peritoneum is concerned. This anatomic fact as regards the pancreas being an organ which can be both retro-peritoneal and entirely in a mesentery, I have observed in cadavers.

Hence, we may affirm that the spleen becomes uncovered from the peritoneum on its posterior border by the separation of the blades of the posterior mesogaster at its base, in the same manner as the pancreas become uncovered by peritoneum by the separation of the blades at the base of the mesocolon transversum. The strip of spleen not covered by peritoneum does not reach to the lower pole of the spleen in cadavers examined by me, but stops short one-fourth to one-third the length of the spleen. The process which exposes the spleen retro-peritoneally, includes an apparent oblique insertion of the mesogaster in the adults. It is, however, purely a secondary or acquired change, brought about by the pressure of the liver exercising itself on the stomach, forcing the stomach to the left, and pressing the root of the mesogaster firmly against the left dorsal, resulting in displacement of the left blade leftward, and fixing the right blade as dorsal parietal peritoneum.

(To be continued.)

SOCIETY PROCEEDINGS.

American Electro-Therapeutic Association.

Fourth Annual Meeting held in New York Academy of Medicine, New York, Sept. 25, 26 and 27, 1894.

WILLIAM J. HERDMAN, M.D., President.

(Continued from page 115.)

DR. W. S. HEDLEY also presented a paper on

THE ELECTRIC DOUCHE.

In the electric douche we have a therapeutic expedient of undoubted promise. Yet in the way of accurate experimental investigation, singularly little seems to have been attempted. Sufficient, however, has been done to demonstrate both its electrical power and its therapeutic possibilities. The idea of the present paper is to point to the nature of the inquiry which has led to these conclusions, to supplement that inquiry by some further experiences, and espe-

cially to enter into greater detail as to how the method may be best systematized and applied.

That the electrized water bath possesses many unique advantages as a means of applying electricity to the body has long been recognized. That it is the best form of application for a certain class of cases is very generally admitted. Not only is it the pleasantest, but it is, of all other methods, the one that best deserves the name of "general electrization." Its efficacy, however, depends in most cases on a general and distributed action rather than on any strictly localized effects. The electric douche has been devised as a means of retaining the advantages of the electro-hydriatic method and at the same time presenting facilities for strict localization and accurate dosage, and seeing the advantages of a labile as well as of a stabile action.

Attempts have been made to attain the above ends by the use of spray or vapor; but such attempts have failed, because the conducting medium had been so broken up and disintegrated that it ceased to act as a conductor. It is manifest that any stream of conducting fluid can only retain its conductivity so long as it remains whole, continuous, and unbroken. Spray is composed of numerous small globules, sometimes appearing as many fine continuous streams, but actually possessing no real conductivity in the sense that applies to the matter under consideration.

The method of application, apart from certain non-essential details, is much of the nature of what would be known in hydrotherapeutics as the "movable jet douche" (douche mobile), and the nozzle is so arranged that the electrized stream escapes in the form of a more or less condensed jet or jets, which, with a certain minimum of pressure, remain unbroken and continuous for a reasonable distance after emerging from the pipe, and therefore for that distance retain their electric conductivity. (There ought to be a means of regulating temperature[1] and pressure.) With this arrangement one pole may be placed in contact with some indifferent part of the patient's body, while the other is connected to the internal metal of the douche, with the result that when the douche is set in action the second pole is brought to the patient by and in the fluid, and may be concentrated as a single jet, or distributed as many small jets. The fluid is, in fact, the second electrode.

Let us inquire, then, by direct experiment, how much current this water conductor carries, and how much enters the body of the patient. The following experiments are necessarily only a selected few, but a sufficient number of results are quoted to give some general ideas. Details of the apparatus are also as much as possible omitted. It need only be mentioned that, permanent water pressure not being available, a hand pump, drawing from a suitable vessel, was used for the douche, which was fitted with a nozzle or rose (having its outer edge insulated with india rubber) of the size mentioned below. The electric apparatus consisted of a Leclanche battery of 74 cells (with a milliampère meter in circuit) and a fair-sized induction coil. One pole was attached to a large electrode on which the patient sat, and the other connected with the metal of the nozzle or rose, well insulated wire being used for the connections. The following results were obtained:

TABLE A.*

Plain water at 98° F., continuous current.

Nozzle.	E. M. F.	Pole to douche.	Distance of nozzle from body.	Current passing.
1. ¼ in. jet (single)	75	—	1.5 in.	5 milliampères.
2. Do. do.	"	"	0.5 in.	15 milliampères.
3. Rose 2-in. dia., forty-nine perforations	"	"	1 in.	5 milliampères.
4. Single jet	"	+	18 in.	Deflection (taken on reflecting galvanometer) right off scale. Probably quite 100 microampères.

[1] Table to show the influence of temperature on the electrical conductivity of water.

R. of bath water taken as it cooled. (By Wheatstone Bridge.)

Temp.	R.
98° F	165
92° "	194
87° "	204
70° "	440

These figures only show the alterations in R. owing to temperature, and the *actual* R. in *this particular bath*. R. varies with volume as well as with temperature.

TABLE B.*

Salt water (½ lb. to 7 gal.), temperature 98° F., continuous current.

Nozzle.	E. M. F.	Pole to douche.	Distance of nozzle from body.	Current passing.
1. Rose	75	—	1.5 in.	7.5 milliampères.
2. Single jet	40	+	18 in.	20 milliampères.

TABLE C.*

Plain water, temperature 98° F., alternating current.

Nozzle.	E. M. F.	Pole to douche.	Distance of nozzle from body.	Current passing.
1. Rose	x	+	1.5 in.	Subject cried out "Stop." Milliampère meter (alternating current) in circuit did not register.
2. Single jet	"	+	12 in.	Noise marked in telephone. Subject felt current.

* The above tables and some of the explanatory matter have already been published in the *Lancet*.

Several readings were taken with alternating current and salt water, all showing that the effect was much stronger with salt water than with plain. These experiments seem to show that electricity can be imparted to the human body by means of the electric douche, provided that sufficient electro-motive force be used and the stream of fluid be continuous. Table B shows that when salt water is used strong currents may be passed over considerable distances with a very moderate electro-motive fore. Table C shows that by using coil currents, which always possess a comparatively high electro-motive force, as much current as a patient can comfortably bear may be passed over many inches of space. Its current-carrying capacity being thus established, we may glance for a moment at its therapeutic effects.

Though the apparatus necessary for the electric douche need not be elaborate nor complicated, there are certain essential details of construction which must not be lost sight of, and without which not only is its efficiency impaired, but the risk of administering objectionable shocks to operator or patient becomes by no means inconsiderable. The main points are somewhat as follows: a proper mechanical arrangement to secure that the fluid conductor shall pass out in unbroken streams or jets for a sufficient distance to conduct the electric current to the patient's body. Irregularly-shaped orifices will often to such an extent break up the column of fluid, even when issuing at considerable pressure, that its conductivity becomes practically *nil*, or, as sometimes happens, it is so intermittent that the current passes in a series of jumps, which are worse than useless for the purpose in question. Further, in the case of "rose" nozzles, if the site of the orifices fall below a certain gauge, relatively to pressure, the issuing jets are too fine, there is no continuity of stream, and consequently no electrical conductivity; or, again, if the orifices be not all of the same diameter, irregular conduction will result. Careful attention must be paid to insulation. Want of due care in this point will soon be notified to those concerned by the unpleasant reminder already adverted to. When it is considered that currents of a fairly high electro-motive force have to be used for the douche, and that nothing is more probable than the occurrence of some unexpected, and perhaps for the moment unavoidable, movement of the patient, whereby the instrument comes in contact with his skin, it is evident that unless the metal nozzle be well insulated a violent, perhaps serious, and certainly unnecessary shock will follow. Attention to insulation is also necessary in connection with the metal pipes and taps which control the water supply, in order that electrical leakage may be avoided. The apparatus consists of a short length of flexible rubber tubing, having an inside conducting wire, one end of which is brought out and connected to a terminal about two inches from the brass union which joins on to the supply pipes. The two inches or so of rubber tubing thus interposed between the metal pipes and the conducting wire act as effective insulation at this end of the arrangement. The other end of the internal wire is soldered to the inside of the metal screw, to which different nozzles are attached. The nozzles are two in number, one a single "jet," for current concentration, the other a "rose," for current diffusion. Each nozzle has an inner base of brass covered with a sheath of vulcanite, which projects one-eighth of an inch beyond the brasswork. The orifices are true circles, and their metallic surfaces carefully smoothed, so that

the issuing columns of water are kept intact for a considerable distance. It will be seen that perfect insulation is thus secured at all points, and even if through accident the nozzle does approach too near the patient, it is the insulating vulcanite, and not the conducting metal, that makes the contact.

By the use of such an apparatus it has been found that, with the ordinary domestic water supply, continuous currents of useful strength may be passed with an E.M.F. of 50 to 60 volts (from a battery of 40 Hellesen cells) when the nozzle is held several inches from the patient. Alternating currents from a fair sized bath coil pass through a much greater distance. Reference to the foregoing table of experiments shows that if saline or other special conducting fluids be used, the distance through which the current passes is of course much increased.

One drawback to the use of the electric douche is undoubtedly the amount of splashing which it causes. This difficulty, however, is easily overcome by simple expedients; the simplest, and perhaps the most effective, being the use of waterproof curtains, suspended round the ordinary bath. These curtains must be of sufficient width to completely enclose the patient when sitting or standing, and should so hang that their lower ends fall just inside the bath. When in use the curtain will be pulled slightly aside so as to admit the douche nozzle. All splashing is thus kept within the inclosed space, and it drains down into the bath.

There was a time in the days of "brutal hydrotherapeutic empiricism" when both physician and patient had a (not altogether inexplicable) dread of the "hydrostatic douche." This, however, has given way before a more enlightened method of administration, and the douche is acknowledged to possess stimulating and alterative properties of no mean order. It seems not unreasonable, therefore, to suppose that in the combined electric and hydriatic procedure we may have a therapeutic agent of considerable power. It claims that according to variations in temperature, force and duration, it may be resorted to as an agent more gentle and adaptable than even the "electric hand" of the physician, or may be made to become so potent and concentrated as to prove a veritable electro-hydriatic moxa. It presents itself as a means of general electrization by bringing the various parts of the body successively under its influence; it claims an action that may be strictly localized; and, further, offers itself as a means of producing, through various motor inhibitory and secretory reflexes, those influences on nervous centers and glands which can undoubtedly be brought about by other and more painful methods of peripheral electrical excitation. If it can establish claims of this kind, a field of usefulness seems to lie before it in a class of cases which readily suggest themselves.

It can not be attempted here to particularize the multiplicity of cases to which such a very adaptable method may lend itself. There are a few leading features, however, in connection with its possible therapeutic uses which may briefly be adverted to.

The action of the electric douche as a means of electrization by bringing the various parts of the body successively under its influence, and as a local application by bringing it to bear on any special part, have already been referred to. Used in this way we shall not fail to find it in a nervine tonic "heightening cutaneous sensibility and quickening motor excitability." It will influence nutrition and absorption by its control over the distribution and circulation of the blood current. It will act favorably also on local diseases, such as chronic joint affections, and promote absorption through its influence on the circulation. Its usefulness in states of general debility and malnutrition, neurasthenia, spinal debility, exhaustion, and any case in which want of "tone" is the prominent feature, needs no showing. These effects will be brought about in more ways than one, but chiefly, perhaps, by the enormous range of reflexes that, by so effective a method of cutaneous stimulation, are brought into action. Its adaptability to some forms of internal application can not fail to suggest itself. Recent therapeutic experiences leave me in no doubt as to the usefulness of the electric douche. I have lately brought it to bear on a case of pressure-paralysis with rapidly satisfactory results. I have called it into requisition for the peripheral portion of the treatment of an old standing paralysis of central origin. I have found it a most useful adjunct to other electrical methods in the treatment of that ensemble of symptoms known as neurasthenia, and in several cases of anesthesia I have found it of such infinite service that, so far as anesthesia is curable at all, I have come to regard the electric douche as a sovereign remedy.

DR. O. S. PHELPS, of New York, presented a paper on

SOME LANDMARKS IN ELECTRO-THERAPEUTICS.

That the wonderful development of electrical appliances within the present decade has not been altogether an unmixed good, may we think be asserted without fear of contradiction. We will not consider its commercial aspect, but confine our remarks to its therapeutic uses. The widespread belief among the laity, that in the latest discoveries in electro-therapeutics, is found a panacea for all their ills, is a rock that should be carefully noted on our charts. It has been a potent influence in putting an electrical outfit in many a doctor's office, with more or less disastrous results to the cause of electro-therapeutics. In this connection an aphorism might be offered—don't use unfamiliar tools. The unsuspecting doctor is too often led into purchasing an "all around outfit" from the enterprising agent for electrical goods—"neat and compact," with which to do all the brilliant work of which he and his patients have read and heard so much—without knowing even the first principles of electro-physics, or the construction of the simplest form of battery. I can not refrain from relating a recent occurrence which illustrates the demand on the part of the laity for electrical treatment, and incidentally an example quite refreshing of the honor of one of our manufacturers of electro-medical apparatus. Mr. B. had been for some time failing in health and was advised to procure a battery for self-treatment. He accordingly went to a well-known dealer and manufacturer to purchase the instrument that was to restore him to health. Instead of selling one to him, he sent him to the writer for advice as to whether he needed electrical treatment or not. An examination revealed the fact that the man had phthisis approaching the third stage.

I am often asked the question, What kind of a battery shall I buy? and in answer to my query, What do you wish to do with it? the reply usually given is: "One suitable for doing all kinds of work." Gynecologic, from A to Z; neurologic, ditto; epilation, cautery, and the general treatment of tumors and rheumatism thrown in. Gentlemen, this would be ludicrous were it not sad. That the picture is not overdrawn, the writer will here confess that it is not many years since his own ignorance of electricity was just as dense, and the object of this paper is to point out some of the stumbling blocks in the way of progress.

Grand and brilliant as is some of the work already accomplished, there is no royal road to success in the cure of disease by electricity, and it goes without saying that those who have attained success in its use began at the bottom rung. The best advice which could be given to those who are unfamiliar with the subject would be:

1. Make a thorough study of at least elementary electro-physics.

2. The construction of the more common forms of medical batteries, and the adaptability of each to the different uses for which medical batteries are needed. One should be able to construct, if need be, or repair any of the apparatus he uses. I do not mean that it would be practical to do so, but to be able to do so makes you master of the situation, and you can not be imposed upon by ignorant or designing vendors.

3. Should come the study of electro-therapeutics—a subject at the present moment illusive, seductive, progressive, having garnered some truths from the chaff of speculation and some successes on a road strewn with many failures; a very useful addition to the physician's armamentarium; a vigorous, promising infant; we hope much for its majority.

Important results in even a single case undoubtedly reached by the use of a particular agent are at least a landmark, and may help to establish a principle.

A little over a year ago the writer was consulted by Mrs. W. Her previous history indicated that she had had several attacks of—in common parlance—pelvic cellulitis, with varying intervals between, though they were at the time diagnosed as peritonitis. An examination proved it to be a case of peri-uterine inflammation, with considerable exudation, compressing the left ovary and involving the broad ligament and tube. She complained of pain in the region involved, increased by any attempt at walking, defecation, or voiding of urine. Her temperature was continuously abnormal—from 100 to 102 degrees. The patient was ordered to bed and a high tension faradic current applied *per vaginam* with a bipolar electrode, with the result of relieving the pain and lowering the temperature. This course was pursued with the object of reducing the inflammation to a point where galvanism could be used. Progress was often interrupted by the indiscretions of the patient, till the family

became impatient and upon the advent of a visit from a brother from Boston, and his decision to have "something done," she was taken to one of our prominent hospitals and pronounced to be a case for operation. However, when her husband was told that probably the pelvis would have to be cleared, and that she might not come off the table alive, he weakened—took her home and sent for her former physician. She was found with all her symptoms aggravated, the exudation having extended to the right side and in front, so that the pressure against the bladder made it impossible to retain more than an ounce of urine, which it was agony to void. The pressure around the left ovary kept her vomiting almost constantly. Dr. Goelet was called in consultation and confirmed the diagnosis and the opinion that surgical interference was out of the question. He advised the continuation of the electrical treatment carried out with the utmost vigor, and for a time the high tension faradic current was used three to six times a day, vagino-abdominal and vagino-bipolar, with the result of reducing the inflammation and modifying the other symptoms to such a degree that galvanism could be brought into requisition. A current of 30 milliampères was used every five days, with the cathode in Douglas' cul-de-sac, and anode to abdomen. The electrodes consisting of a pad, 6 x 6, in one case, and a suitable vaginal electrode in the other; time of application seven to ten minutes, followed by a fifteen minute séance with the bipolar faradic, which relieved all pain and irritation caused by the galvanic treatment. In four weeks the patient was able to come to the office. The case has steadily progressed till now there is only a small nodule the size of a walnut. She can stand upright, walks, rides, and performs household duties, without pain or inconvenience. Has gained in weight from 75 to 145 pounds.

I do not cite this case as an argument against surgical interference when indicated; or a cure-all in all the pelvic diseases common to women. But will submit to you that granting in this case a hysterectomy to have been feasible and followed by the best results that operation can afford, is the patient to be envied because she has not played a part in so brilliant a procedure?

Case 2.—Miss D., aged 17 years, first noticed slight leucorrhea in November, 1893; a little later constipation and slight abdominal pains after defecation, and also some pain when the urine was voided. These symptoms, slight at first, gradually increased, and in January she was taken from school, the bowels regulated and rest enjoined. This was followed for a short time by some improvement; but in March so much anxiety was caused by her condition that the family physician was called, who made an examination and informed her parents that he found a growth in the pelvis to the left of the uterus. He advised a course of medication looking toward absorption, tonics, good feeding, etc. For a time there was some amelioration of the symptoms; but a slow reduction in weight from 120 pounds in November to 104 pounds in April, was not encouraging. In June she became much worse, great pain in the bladder and inability to retain the urine. She was in fact treated for inflammation of that organ. This last exacerbation so alarmed her friends that steps were inaugurated to have something more radical done, and they were advised to bring her to New York for an operation for removal of the growth. She came under the writer's care on July 6. Her condition at that time was very unpromising, pain continuous and increased by the slightest move and more particularly upon evacuating the bowels or bladder or tension of the abdominal muscles, the body being bent forward to quite an angle. She was greatly emaciated, weighing only seventy-three pounds; temperature from 100 to 103 degrees, no appetite, and extremely weak. This, in a general way, was the picture she presented. An examination made under an anesthetic showed a fibrous growth which had pushed the uterus well over to the left, flattened and reaching well up toward the umbilicus. Whether part of this was an exudation from the peri-uterine inflammation could not then be fully established, but subsequent treatment proved that it was. The left ovary was involved in an exudation and the bladder was impinged upon, causing the bladder symptoms which had given so much trouble earlier in the case. After a rest of a few days, Dr. Goelet was called in consultation and under an anesthetic she was again examined, confirming the above and advising a continuation of the treatment already inaugurated, viz., the high tension faradic current vagino-abdominal and sacro-lumbar, with the view of reducing inflammation, pressure and pain, and improvement of her general condition, so that some radical measures could be taken, among which would be galvanism and ligation of the uterine arteries. For some time very little progress was made, but finally all the symptoms began to yield; pressure, pain, temperature and improvement was unmistakable. During the past four weeks the temperature has been normal, entire freedom from pain, weighs eighty pounds, can stand erect, walks about the house, and says she is much more comfortable in every way than she has been for ten months. The next step in the case will be galvanism, the result of which will determine whether the knife will be resorted to or not.

These cases will suffice to illustrate a very interesting field in electro-therapeutics and in gynecology as well. They prove that congestion and inflammation can be successfully treated by electricity under proper conditions with a suitable apparatus discreetly applied, our past instructions notwithstanding. They also indicate that many cases which are at once relegated to the surgeon's knife can be cured without the ordeal of an operation and the unsexing of the patient, and many others prepared for an operation, better I believe than in any other way. I also believe there are many cases where a hysterectomy would at first seem to be the only course to pursue, that with preliminary electrical treatment and the modified operation for ligating the uterine arteries, devised by our worthy ex-President, Dr. Goelet, the patient can be cured with the pelvic organs left intact.

To recapitulate: we would again say to the would-be electro-therapeutist: there is no royal road to the cure of disease by electricity. Each case is a law unto itself, and must be carefully studied as such. Make yourself master of the situation both by knowledge of electro-physics, construction, character, and quality of apparatus and knowledge, to date, of electro-therapeutics—remembering as well that the best specialist is the best all round doctor—following which, all other means such as appropriate hygienic conditions, diet, rest, and proper medication, will be brought into requisition. As physicians we should seek the glory of a cure, rather than the glory of any agent.

DISCUSSION.

Dr. Goelet said he had seen with Dr. Phelps the cases reported in the paper, and the outlook had been certainly very unfavorable in both at first. The results obtained by Dr. Phelps served to convince him that much more could be accomplished with the faradic current than even he had hitherto supposed. In the second case the continuance of the current was suggested simply to improve the patient's general health and prepare her for operation. Dr. Phelps was to be congratulated upon the result he had been able to accomplish in these two cases. He wished to correct the impression which may have been made that he had devised the operation of litigation of uterine arteries. That however, was Dr. Martin's, of Chicago.

Dr. Ross thought that with the mild current employed one would hardly have expected that there would have been the rise of temperature in the case reported.

Dr. Phelps, in closing the discussion, said that he had understood that Dr. Goelet had modified the operation of ligation of the uterine arteries, and it was to this he had intended to refer. In the second case related, the very low condition of the patient and the long continued abnormal temperature without any change, so far as could be detected, would have certainly have discouraged him from continuing its use had it not been because of former successes following the persistent use of the current.

Dr. Robert Newman, of New York, read a paper on

REICHARDT NEW GALVANIC BATTERY FOR ELECTRIC ILLUMINATION.

This battery consists of four cells each 2 volts, and all four cells will give 6 ampères. Experiments on July 7 and 8.

The battery can scarcely be used as a galvano-cautery, and will heat only a small platinum burner. It is intended to illuminate cavities, particularly with a lens used as a head mirror.

Test with a Leiter's cystoscope which needs 7 volts; a bladder (manikin) was *well* lighted up, with one inch left burning outside of the elements of the fluid. The light was bright for five minutes. Agitation of the fluid kept the light up for five minutes longer, when polarization made the light a little uncertain. Then the elements were lowered into the fluid its full length, and the light was restored to the same capacity as it was when first tried. This kept up five minutes longer. Hence a constant continued light could be kept up for fully fifteen minutes with this battery—after that time more polarization took place, so that the light faded after twenty minutes. However, even then an examination could be made. After twenty-five minutes the light

grew uncertain and the cells were so hot that the elements had to be raised out of the fluid and the test discontinued.

After an intermission of ten minutes the battery gave again an excellent illumination, but the cells were overheated and could not be used. It takes about one hour to cool off the cells respective of the fluid.

It can be stated that this battery will give a good light for examination fully fifteen minutes, whenever 7 or 8 volts are required.

The battery fluid used for these tests was weak, only 1 part sulphuric acid to 9 parts of water with bichromate of potasse, which solution is sufficiently strong. A stronger solution may be used for this battery which, however, is not needed, as the one just described works well enough, and is more economical, saving the zincs of the elements. After each use, the elements should be cleansed by letting water run over it.

Description of the battery: the battery stands on a platform four and three-fourths inches square. The height of the whole instrument is twelve inches and when the elements are immersed in the fluid only seven inches. Four cells, each five inches high by two inches square, each may contain five ounces.

Elements: each cell contains two carbons and one zinc and can be used with either one, two, three or all four cells.

Instead of the rheostat, the potential can be regulated by the distance the elements are immersed in the battery fluid and also by the number of cells used.

Weight is four pounds and thirteen ounces.

SECOND DAY, SEPTEMBER 26—EVENING SESSION.

BUSINESS MEETING.

The meeting was called to order by the President at 8:40 P.M. On motion, the reading of the minutes was dispensed with. The report of the Secretary was then read.

THE PRESIDENT—It has been customary to have these accounts transferred to a committee for auditing. Is this the desire of the Association? On motion, the President was requested to appoint such a committee, consisting of two. Dr. Charles R. Dickson and Dr. Brown were appointed. Upon their suggestion and approval, the report was accepted, as read.

The Secretary's report on matters from the Council was then read.

A report of the meeting of the Executive Council, of Monday, Sept. 24, 1894, and its recommendation was then read.

THE PRESIDENT—It is your duty to confirm this action of the Council. A motion was duly made and carried, confirming the recommendations of the Council.

The Treasurer's report was then read and accepted.

The Secretary announced that the Council had decided that the papers might be published where the authors desired, but that a copy must be placed in the hands of the Secretary before the adjournment of the meeting.

A lengthy discussion was entered into by DRS. MASSEY, CLEAVES, SMITH, DICKSON, NUNN and WALKER, as to the question of having papers which had been read before the Society published elsewhere before being published by the Association.

DR. KELLOGG moved as an amendment that the members be permitted to publish *abstracts* of their papers. Seconded by DR. DICKSON, and carried. The original motion as amended was also carried.

THE PRESIDENT—The next thing is the matter of continuing Standing Committees on Instruments. A motion was made and carried, postponing action on this matter.

ELECTION OF OFFICERS.

THE PRESIDENT—The next in order is the election of a President, two Vice-Presidents, a Secretary, and a Treasurer, and five members for the Executive Council.

DR. A. H. GOELET—I take great pleasure in nominating a man who was a pioneer in modern methods of electricity in America. I am sure you will all agree with me that we could procure no better man to fill the high office of President than DR. A. LAPTHORN SMITH, of Montreal.

DR. W. J. MORTON seconded the nomination, and on motion, the nominations were closed.

On motion, the Secretary was instructed to cast one affirmative ballot on behalf of the Association for DR. A. LAPTHORN SMITH as President.

DR. A. LAPTHORN SMITH—I thank you very heartily for the honor, which was entirely unexpected. Your confidence in me will lead me to make greater exertions in the interest of the Association, and I promise you I will not allow the work to deteriorate during my term of office. Again, I thank you heartily.

DR. MASSEY—We went to Canada for a President; let us go West for a Vice-President. I take pleasure in nominating DR. J. H. KELLOGG, of Battle Creek, Mich.

DR. DICKSON seconded the nomination.

DR. GOELET—I take pleasure also in nominating DR. C. R. DICKSON, of Toronto, for Vice-President.

DR. KELLOGG seconded the nomination.

DR. HOLFORD WALKER, of Toronto, was also nominated, but declined.

On motion, the nominations were closed. Ballots were distributed, and the tellers announced that DR. KELLOGG had been elected first Vice-President, and DR. DICKSON second Vice-President.

DR. GOELET—I take pleasure in placing before you in nomination the name of a man well known for his executive ability and to whose energy we are indebted for the very excellent exhibit in the adjoining room, and furthermore he is a New York man. I nominate DR. EMIL HEUEL for Secretary.

On motion, the nominations were closed.

On motion, the Secretary was instructed to cast an affirmative ballot for DR. EMIL HEUEL for Secretary.

DR. W. J. MORTON—I take pleasure in nominating for Treasurer the same sunny-faced gentleman we have had heretofore—DR. NUNN, of Savannah, Ga.

On motion, the nominations were closed, and the Secretary was instructed to cast one affirmative ballot for DR. NUNN for Treasurer.

The following gentlemen were then nominated and elected to the Executive Council: DRS. W. J. HERDMAN, G. BETTON MASSEY, W. J. MORTON, A. H. GOELET, and O. B. DOUGLAS.

DR. R. J. NUNN—In rising to make this motion I am about to appeal to the sensibilities of every member in the Association. I desire to express the obligations we are under to our retiring Secretary. We appreciate the work she has done, which has been so great as to cause her health to give way in the interests of the Association. I therefore move that by a rising vote the thanks of the Association be now tendered to DR. MARGARET A. CLEAVES for the able and self-sacrificing manner in which she has performed the duties of Secretary of this Association.

THE PRESIDENT—As retiring President I would say to you that every word of this motion has its full meaning. No one could have done better work than she has done. It is out of regard for her that we do this.

The motion was then put, and carried unanimously.

DR. A. LAPTHORN SMITH then expressed the wish that the Association would decide to meet in Montreal next September, and assured them that if they did so they would have a hearty welcome.

On motion, the Association then adjourned to participate in the reception tendered them by the resident members.

THIRD DAY, SEPTEMBER 27—MORNING SESSION.

BUSINESS MEETING.

The meeting was called to order by the President at 10 A.M.

THE PRESIDENT—The suggestion I made at the first part of the meeting has apparently met with general approval. These committees were organized two years ago with the object of having some person responsible for looking after the apparatus which is being prepared for our purposes by the mechanicians. Until recently we have been largely in the hands of the mechanicians who have made up our machines, and have told us how we should use them. Now we have got to the point where we can dictate to them, and tell them just what we want. In this pioneer work, however, it is necessary that some person should be responsible for the construction of our apparatus, and also that we should be able to place ourselves in a representative position before the profession at large. The members of the various committees have not fully understood the scope intended for their work, as I originally suggested it, but they are beginning to understand it now. They should make practical tests of the various apparatus, and also give us an epitome of the work of the year in their respective departments. It is my desire, and that of many others in this Association, that these committees be put upon a more comprehensive basis. If you will turn to the Constitution and By-Laws you will see the list of the various committees. It was our original intention to adopt standard coils, and standard machines of various kinds, but we have since come to the conclusion that by so doing we would become more or less embarrassed, becoming the aiders and abettors of some particular manufacturer. All that we need to do is to state what is required in a particular instrument or apparatus, and to adopt certain stand-

ard principles, and hence I suggest that we should leave out the word "standard," wherever it occurs in connection with the titles of these committees. Lastly, I would suggest that a committee on Electric Light Apparatus for Diagnosis and Therapy be formed. I would also introduce the following sentence: "The following committees are expected to collate information and make careful tests as to the nature and efficiency of all instruments put on the market in the class assigned to them, and to make full reports of their investigations at the annual meeting." I would introduce a sentence of that sort as explanatory of the functions of these committees. You must take action in order that the committees be continued, and I will appoint the members for these different committees. I am ready to entertain such a motion.

DR. GOELET—I make a motion to that effect. Seconded by DR. BEAVER, and carried.

DR. BEAVER—We all know that instrument makers have their own methods of connecting the conducting cords to the battery and with the electrodes—by springs and screws of various sizes. I think we should make an effort to get the instrument makers to adopt some uniformity in this respect. I move therefore that the Committee on Electrodes be instructed to communicate with the manufacturers and endeavor to have them adopt some uniform connections. Seconded and carried.

DR. GOELET announced on behalf of the Council that the Association had been invited to Montreal, and he thought it would be eminently wise that the Association accept this invitation, especially as the next President was from Montreal.

DR. DICKSON—I have been asked by DR. A. LAPTHORN SMITH to urge the Association to meet next year in Montreal, as he has found it rather difficult work to excite sufficient interest among the profession there in the subject of electro-therapeutics. I am assured that you will meet with a hearty welcome, and I am positive that you will not be sorry for choosing this for the next place of meeting. There are many places of interest in the surrounding country, and the city is easy of access.

DR. BEAVER—I move that the next meeting of the Association be held in Montreal, the date being left to the Council. Seconded.

THE PRESIDENT stated that DR. SMITH had told him that he could get the support of the laity in Montreal, but perhaps not of the medical profession.

DR. BEAVER—I would change the motion then so as to read Toronto instead of Montreal.

DR. WALKER assured the Association of a hearty welcome at Toronto.

The motion was then put and carried that the Association should meet in Toronto.

The Secretary moved that the Association pass a vote of thanks to the New York Academy of Medicine, to MR. NIKOLA TESLA, to the Edison Manufacturing Company, to the Resident Fellows, and to the Committee of Arrangements. Seconded and carried.

The Secretary announced that DR. GEHRUNG had sent a letter of regret at his inability to be present at this meeting.

SCIENTIFIC SESSION.

Report of the Committee on Constant Current Generators and Controllers, by DR. W. J. HERDMAN, of Ann Arbor, Mich. (The report was not read, but the main points were briefly stated.)

DR. NEWMAN presented a separate report on this subject. (MS.)

MR. BROWN also presented a report on Secondary Batteries. (MS.)

On motion of DR. WALKER, the report of the Committee was received and referred to the Council for publication.

"Notes on the Effects of High Frequency Electrical Discharges passed through the Body," by PROF. ELIHU THOMSON, M.A.I.E.E., of Lynn, Mass., was read by DR. HERDMAN.

(To be continued.)

The Ohio State Medical Society.

Annual Meeting held at Columbus, May 15, 16 and 17, 1895.

FIRST DAY—AFTERNOON SESSION.

The Society convened in the Chamber of Representatives, State Capitol Building, Columbus at 2 P.M., the President, D. N. KINSMAN, M.D., occupying the Chair.

DR. W. T. HOWARD, of Cleveland, Ohio, read a paper on

THE ANTITOXIN TREATMENT OF DIPHTHERIA.

After considering the methods of arriving at a standard, giving preference to that of Behring as being the most accurate, and dwelling upon the mode of production of antitoxin in the body and the manner of its action, Dr. Howard continued as follows:

From the beginning of the use of antitoxin in the treatment of diphtheria, there has been a marked lowering of the death rate. Thus the German hospital statistics, with their mortality of from 35 per cent. to 65 per cent. showed under the influence of the new remedy, a mortality rate of from 11 per cent. to 25 per cent. Kossel reported 233 cases with a mortality of 23.2 per cent. Katz reported 128 cases in Baginsky's wards a mortality of 13 per cent. Virchow gave the treatment the weight of his authority when he reported 303 cases treated with antitoxin with a mortality of only 13.2 per cent., and 230 cases treated without antitoxin with a mortality of 47.8 per cent. In Roux's first series of 448 cases there was a mortality of 24.3 per cent. while at the same time the mortality from cases not treated with antitoxin in the Hospital Trousseau was 60 per cent. Later Roux's mortality has fallen to below 10 per cent. In Vienna 100 severe cases were treated with a mortality of 24 per cent. Foster of Washington (*Medical News*, Feb. 2, 1895) has gone to the trouble of tabulating the comparative results of diphtheria cases treated with antitoxin and by the ordinary methods. He found that in 2,740 cases—selected and unselected—collected from literature treated with antitoxin, 509 died, a mortality of 18.54 per cent.; of 4,445 cases selected and unselected, and including as did the other cases upon which tracheotomy and intubation were done, not treated with antitoxin, 2,017 died, a mortality of 45.36 per cent. Probably the most interesting series of cases reported in America is that of Biggs, in which 255 cases of diphtheria were treated in the Willard Parker Hospital and in the tenement houses of New York. There were in these 255 cases, 40 deaths, or a mortality of 15.69 per cent. If 15 cases in which death took place in less than twelve hours after the serum was administered are deducted, the mortality was only 10.4 per cent. During the same period, according to the statistics of the Health Department, the mortality from diphtheria in New York was from 25 per cent. to 35 per cent. At the recent German Congress of Internal Medicine held at Munich, Huebner and Baginsky of Berlin, and Wederhofer of Vienna, among others, indorse the serum-therapy and note striking lowering of the mortality following its use. The experience of the writer in the recent Ashtabula epidemic was gratifying. In 40 cases treated with antitoxin there was a mortality of 7.5 per cent., while of 82 non-selected cases occurring during the same epidemic treated by ordinary means the mortality was 27 per cent. A series of 150 children with diphtheria treated with Roux's antitoxin, have just been published from Paris, with a mortality of 10 per cent. The experiences of individual observers might be multiplied almost indefinitely. The difference in the results obtained according to the day upon which treatment is begun, first emphasized by Kossel, is striking. It is however, what, *a priori*, one would expect. In Kossel's 233 cases, of those treated on the first day of illness 100 per cent. recovered; on the second day 97 per cent.; on the third day 89 per cent.; on the fourth day 77 per cent; on the fifth day 60 per cent.; on the sixth day 47 per cent.; and between the seventh and fourteenth days 51 per cent. The accumulated experience since Kossel's publication fully bears out his figures. For instance, Foster, analyzing 2,740 cases, of those treated on the first day of the disease none died; on the second day the mortality is 2.83 per cent.; on the third day 9.99 per cent.; on the fourth day 20 per cent.; on the fifth day 33.33 per cent.; after the fifth day 41.38 per cent. The mortality is also always higher in children under 9 years than in children above this age and in adults.

Clinical Observations.—An early and rapid improvement in the general condition of patients treated with antitoxin has been noted by nearly all who have used the remedy. The pallor and blueness of the countenance usual with diphtheria patients quickly disappears, or if the case is treated early in the disease this symptom does not develop. Children with large masses of false membrane in their throats are bright and playful. This improvement in the general condition, in the writer's experience often takes place in from twelve to twenty-four hours. It is not uncommon to see severe and malignant cases sitting up in bed playing, within from twenty-four to forty-eight hours after the beginning of the treatment. The earliest and a very characteristic effect is a marked improvement of the heart's action

and of the pulse. The heart beats are slower and the sounds louder. The pulse falls rapidly in frequency, at the same time increasing in strength and volume. In the writer's experience the pulse rate would fall even in the worst cases twenty beats in the first twenty-four hours. In from twenty-four to forty-eight hours it was not unusual to find the pulse 80 or 90 per minute. Often within fifteen minutes after an injection, a rise in the arterial tension was noted. No change in the respiration due to the remedy itself is described, except in young children, in whom it may be accelerated. The only effect upon the respiration is its improvement incident to the removal of mechanical obstruction, due to the presence of false membranes in the air passages.

According to Roux, if the remedy is given at the very outset, the temperature rises only slightly above the normal In fully established cases of the disease the temperature falls in a marked manner, often on the day succeeding the first injection. The fall is rapid, the temperature line descending almost vertically. In severe cases the temperature fall is gradual, and it may not reach the normal for several days. When the temperature remains high, in the absence of mixed infection, it is usually to be regarded as an indication for more of the remedy. In the writer's experience the fall in the temperature was usually marked. In mild cases and in cases of medium severity this fall was usually sudden; in severe and malignant cases it was more often gradual.

The changes in the local lesions are marked and striking. In the writer's cases, for the first twelve to twenty-four hours there was no change in the appearance of the false membrane. In severe and malignant cases, it sometimes was increased during this period. But usually its formation ceased within twenty-four hours after the first injection. Generally after the first twenty-four hours the false membrane lost its dry, opaque grayish appearance, and became moist, somewhat translucent and milky white. Slight filmy false membranes would rapidly disappear. The thick false membranes in from twenty-four to forty-eight hours begin to separate both from the surface and from the borders. It is quite characteristic to see the false membrane curling up and separating at the borders, where it joins the mucous membrane of the part. The false membrane disappears in the majority of cases by the third day. It may disappear earlier or later, as late as the seventh day in our experience. The swelling of the cervical glands usually begins to subside before the disappearance of the false membrane. The glands, however, not infrequently remain somewhat enlarged and tender and appreciable to the touch for some time. If the glands are not already swollen at the beginning of the treatment, they do not usually enlarge.

Some observers have held that diphtheria antitoxin causes albuminuria. This is one of the most actively investigated questions now in the antitoxin treatment of diphtheria. Much will depend upon its decision. The question is a very complex one, for it is well known a very large proportion of severe cases of diphtheria, treated by any mode of treatment, have more or less albuminuria. According to v. Jaksch, all severe cases of diphtheria have albumin in the urine. The injection of large amounts of the antitoxin into dogs has failed to produce albuminuria. The presence of the carbolic acid used to preserve the antitoxin has been objected to as a possible cause of nephritis. But it has been found that the injection of carbolic acid in solutions of the same strength used in the Behring antitoxin causes neither albuminuria nor nephritis in dogs. Altogether, the weight of evidence points to the conclusion that diphtheria antitoxin lessens the percentage of cases of albuminuria in diphtheria and does not cause nephritis. It will, however, require the study of a large number of carefully investigated cases to settle this, as well as other mooted points. Roux is positive that albuminuria is less common when antitoxin is used. Most observers hold that albuminuria existing before the antitoxin was given is not only not augmented, but is soon lessened and disappears.

From the beginning, it has been asserted by all, that cases of mixed infection fail to show the rapid improvement under the influence of antitoxin, so striking in cares of pure diphtheria. The antitoxin does not seem to increase the immunity against the organisms of mixed infection (the streptococcus and staphylococcus), in the slightest degree. However, it appears to be established that cases treated early with antitoxin are much more liable to escape mixed infection than cases coming late to treatment or treated by ordinary means. It is also established that cases of mixed infection do better under the antitoxin treatment than under any other. The explanation here is that if the diphtheria toxemia is eliminated from the case, the body is in a very much better condition to struggle against the microörganisms causing the mixed infection, and the patient's chances are improved by that much. Clinical observation on this point has been substantiated by Roux on animals. It may be said that while antitoxin when given early very much lessens the chances of mixed infection, any considerable lowering of mortality in cases of well-established mixed infection is not to be looked for.

When antitoxin is used, the proportion of cases of "descending croup" is very much diminished. Results show that intubation is very much better adapted to cases of laryngeal diphtheria, whether primary or secondary, than is tracheotomy. The tube is quite sufficient in the large majority of cases to keep the air passage open until the false membrane is thrown off. Intubation is to be looked upon as the "complement of antitoxin." Several cases of recurrence of diphtheria after the use of antitoxin have been recorded. Gaebel reports two such cases. The re-infection occurred in one case on the twenty-seventh and in the other on the twenty-eighth day. Both cases rapidly yielded to injections of antitoxin.

The amount of antitoxin given must depend upon the effect produced in each individual case. The best guides are the effects upon the pulse and the false membrane. According to Ehrlich and Kossel, the amount necessary is from 400 in light cases to 1,000 to 1,500 antitoxin units or more in severe cases. The amount in cubic centimeters will vary with the strength of the preparation. For instance, 1 cc. of the Behring No. 1 contains about 60 antitoxin units; 1 cc. of Roux's from 50 to 60; 1 cc. of the Behring No. 2, 100. The antitoxin used at Ashtabula was found by Dr. Arey, in my laboratory, to have an antitoxic value of 60 units. Janowski has found Aronson's antitoxin about the same strength as Behring's No. 2. Some of the antitoxin obtained from the horses of the Health Department of the city of New York is stronger than Behring's No. 3. Kinyoun, of Washington, has also obtained a very strong antitoxin.

The remedy is to be injected subcutaneously with a large hypodermic syringe, of from 10 to 20 cc. capacity. It is of the utmost importance that the syringe should be kept sterile. Several special syringes with asbestos sponges which will stand steam or hot dry air disinfection have been invented. But probably the one most generally used will continue to be the old style syringe with the leather plunger. This can be quite safely sterilized with a thorough washing with a 5 per cent. carbolic acid solution before and after using. The skin at the point of injection should be cleansed and sterilized. It is probably not necessary to use a dressing after the injection, though it can do no harm. In the experience of the writer, the buttock is at once the most accessible and least painful point for injection. It is usual to give in severe cases 1,000 antitoxin units at once, and to repeat in twenty-four hours. One may, however, divide the dose and give half at first and the rest after ten or twelve hours. Mild cases usually require only from 400 to 600 antitoxin units. Severe and malignant cases often require from 4,000 to 5,000 or more. It does not seem to make much difference whether the antitoxin in solution is concentrated or diluted, provided always the necessary number of antitoxin units are given. Other things being equal, however, it is better to use an antitoxin of a high immunity grade. High temperature, rapid pulse and symptoms of toxemia, unless clearly due to mixed infection, are always indications for more of the remedy.

For the production of immunity, small doses are sufficient. From 60 to 400 or 600 antitoxin units are usually given. The size of the dose will depend upon the body weight and age. The artificial immunity thus produced lasts for a variable time, from a few days to six or more weeks. In a diphtheria-infected household, every one should receive immunizing injections. If others take the disease after a few days the injections should be repeated. Almost invariably individuals contracting diphtheria after these injections have mild cases, which yield readily to small doses of antitoxin.

Nearly all of the dread sequelæ of diphtheria are either entirely absent or very mild in cases treated with antitoxin. The proportion of cases having paralysis is very much reduced. In the forty cases of which the writer has notes there was only one case of paralysis, while in cases in the same epidemic treated by the ordinary measures paralysis was common. Heart lesions, both mural and endocardial, are very much less common in the antitoxin cases. In the writer's forty cases, in only three was there cardiac irregularity following the disease. All of these cases made rapid and perfect recoveries. One case, however, in which treatment was

not begun until the sixth day, died suddenly of acute dilatation of the heart.

With the earlier disappearance of the false membrane in antitoxin-treated cases, it is probable that the diphtheria bacilli disappear earlier from the throat than in cases treated by other means. However, there is not enough evidence at hand to decide this point. The writer's experience has not been sufficiently large to draw positive conclusions. It will take the study of a large number of cases to arrive at a definite solution of the question. Cases should be isolated until they have been proved free from diphtheria bacilli. By immunizing individuals in diphtheria-infected houses, epidemics of diphtheria can be rapidly controlled. Although in cases coming early under treatment, antitoxin may be regarded as a specific against diphtheria, in some cases, especially cases treated late in the disease and in cases of mixed infection, the use of other measures the value of which is well established, should not be neglected. The writer has seen such cases, which in his opinion, would have certainly died but for the timely use of stimulants. An abundance of good food is of the highest importance. It is advised to gargle or to spray the throat at short intervals with some mild non-corrosive antiseptic solution. In the opinion of the writer, copious irrigation of the affected surfaces would be more efficacious. It seems probable that as ordinarily used the local application of antiseptic agents is of little value. In many cases, certainly, they do not reach the source of the trouble, which lies buried in the false membrane. As the latter is thrown off under the influence of the antitoxin, the proper use of antiseptic solutions is of the highest importance, as the diphtheria bacilli can then be reached and acted upon. Although the bacilli may not be killed outright, their virulence is at least very much lessened. After the disappearance of the false membrane, it is important to destroy diphtheria bacilli remaining in the throat, thereby not only lessening the chances of the patient infecting others, but very materially shortening the period of quarantine. The ideal treatment of diphtheria in the future must aim first at the destruction of the infectious agents *in situ*, and secondly at counteracting the poison absorbed into the system. The latter requirement is undoubtedly filled by the antitoxin. The first is apparently accomplished by the early and frequent application of the solution recommended by Löffler. The use of this latter agent is very promising in cases of mixed infection. Recently the streptococcus antitoxin has been successfully used in the treatment of puerperal fever, erysipelas and other streptococcus infections. If these results are confirmed by others, a great step forward will be made in the treatment of mixed infections in diphtheria.

From the first it has been observed that a certain proportion of cases treated with antitoxin, after from three to fifteen or more days developed painful skin eruptions, usually urticaria and erythema multiforme. The occurrence of joint and glandular swellings and severe muscular pains is met with in a certain proportion of cases. These with the skin eruptions appear to depend rather upon the preparation of antitoxin used and the individual susceptibility of the patient than upon the size of the dose. Their occurrence is not to be looked upon as due to the presence of infectious agents in the antitoxin, but to some unknown chemic body in the horse's blood serum which is poisonous for certain human beings. Although the symptoms produced by the poison are distressing, they are not dangerous to life and disappear without treatment in a few days.

In the diphtheria antitoxin we have a specific for the diphtheria poison when applied early in the disease; and the later the use of the remedy the greater the mortality. The agent is antitoxic and not bactericidal in its action, in the sense that it kills diphtheria bacilli present in the affected part.

DR. F. D. CASE of Ashtabula, Ohio, read a paper on

A CLINICAL REPORT ON THE DIPHTHERIA EPIDEMIC AT ASHTABULA.

As the title of this paper implies, it is not my intention to write a systematic essay on diphtheria, but rather to present the salient points of the recent epidemic at Ashtabula, the following distinctive features of which make it worthy of your attention.

1. It is one of the few well authenticated instances of an extensive epidemic of diphtheria due to infected milk.[1]

2. It was the first epidemic of the disease in this country in which a general use was made of antitoxin, and an opportunity afforded to contrast the result with other accepted modes of treatment.

Most of the time, for three years or more, there have been cases of diphtheria in the first and sixth wards which adjoin Lake Erie and contain a large foreign population employed on the coal and iron docks. Among these people the enforcement of quarantine restrictions is extremely difficult. The disease was of a severe type with large mortality. In these wards in 1891 there were three deaths from diphtheria; in 1892 seven deaths; in 1893 nineteen deaths; and in 1894 nineteen deaths. During these years up to September, 1894, the other four wards were entirely free from the disease. In September and October, 1894, there were eight cases confined to a small section of the fourth ward. This was speedily stamped out, no cases being reported from that ward in November.

The first case ushering in the epidemic under discussion, resided on West Street in the fifth ward and was taken ill Dec. 4, 1894. December 5 there were six additional cases located on Bell Street in the third ward; Center and Henry Streets in the fourth ward, and Bond Street in the fifth ward. On the 6th, eight more cases was taken ill on Station Street in the second ward; and on Center, Henry, Gary, Main, Tyler and Chestnut Streets in the fourth ward. On December 8 it was estimated that there were thirty cases in the second, third, fourth and fifth wards of the city. The first death, that of the first person taken ill, a lady 30 years of age, occurred December 9. On the 10th it was estimated that there were forty cases in the four wards mentioned, and the Board of Health declared the disease epidemic in that part of the city south of the main line of the L. S. & M. S. Railway. The public schools in these wards were ordered closed.

The simultaneous occurrence of such a large number of cases excited great alarm on the part of the public, and led to a rigid investigation on the part of the health authorities.

For two weeks previously a model of a Swiss village had been on exhibition, both day and evening, at 235 Main Street. Hundreds of children from the infected first and sixth wards as well as from the other parts of the city had been in attendance and the opinion soon became general that this furnished an explanation of the sudden outbreak of the disease. An investigation showed this theory untenable, as a large number of those taken ill had not visited the exhibition. The sewerage and water supply were each in turn inquired into and found free from suspicion.

When attention was called to the food supply, it was found that all cases up to December 10 were in families that procured milk from a wagon of Smith's milk line, driven by Henry Smith. An inspection of Smith's dairy showed the cows to be in good condition and free from any indication of disease. They were supplied with pure spring water and the barns and yards were in good sanitary condition. Henry Smith, driver of the wagon that supplied the infected families, was suffering from sore throat as early as December 2 and perhaps a day or two earlier. He continued on the wagon, however, except on the 5th and 6th, when his place was taken by another man.

December 12. The Health Officer reports that since December 4 there have been forty-nine cases of diphtheria reported, forty-seven of which were in that part of the city south of the L. S. & M. S. track. Of the forty-seven cases, forty-five are in families that used Smith's milk. By resolution of the Board of Health, Smith was prohibited from delivering milk for fifteen days after December 11. In this connection the following cases are of interest:

Mr. P. and his two sons, aged 6 and 12 years, were taken ill with diphtheria in the early morning of December 5. Mrs. P. had gone from home December 3, and was at this time in Binghamton, N. Y. On the evening of December 2 they all partook freely of milk for supper. The milk was procured of Henry Smith. Other members of the family did not use the milk and did not contract the disease.

Mrs. S. usually procured her supply of milk from another source, but on the morning of December 2 purchased one quart of Henry Smith. December 5 and 6 she was ill in bed with sore throat but did not call a physician. On December 19 her son, aged 14, was taken ill with diphtheria, received the antitoxin and recovered. There had been no known exposure to the disease, except from the mother.

Many instances like the above could be cited. It is true that the evidence pointing to infected milk, as the cause of the epidemic is entirely circumstantial, since after repeated examinations the bacillus of diphtheria was at no time found in cultures from the milk or from the throat of Henry Smith. Yet most of our opinions in clinical medicine and

[1] See Powers report to Local Government Board, Universal Med. Sci., Vol v, p. 230; also Clark's report in same.

therapeutics, like most decisions in law, are based upon circumstantial evidence. As Chief Justice Gibson has said: "You see a man discharge a gun at another; you see the flash, you hear the report, you see the person fall a lifeless corpse and you infer from all these circumstances that there was a ball discharged from the gun which entered his body and caused his death, because such is the usual and natural cause of such an effect. But you did not see the ball leave the gun, pass through the air and enter the body of the slain; and your testimony to the fact of killing is therefore inferential, in other words circumstantial. It is possible there was no ball in the gun, and we infer that there was, only because we can not account for death on any other supposition."

It is true that many persons used milk from this same wagon who did not contract the disease. It is of course not known whether every can of milk on a given day was infected and if such was the case, the inherent resisting power of many persons to infectious disease would explain the exception. The array of a large number of negative cases—those in which exposure is not followed by disease—is of little importance, unless at the same time an explanation having more elements of probability is at hand. The chances of such a series of admitted coincidences not due to a common cause is too small for calculation.

In Watson's "Practice of Physic," in the chapter on Continued Fevers is the following: "A man might say, 'I was in the battle of Waterloo and saw many men around me fall down and die, and it was said they were struck by musket balls; but I know better than that for I was there all the time and so were many of my friends and we were never hit by any musket balls. Musket balls therefore could not have been the cause of the deaths we witnessed.' And if, like contagion they were not palpable to the senses, such a person might go on to affirm that no proof existed of there being any such thing as musket balls."

December 13. Dr. Miller of the State Board of Health, accompanied by Dr. W. T. Howard Jr., Professor of Bacteriology in the Western Reserve University, arrived for the purpose of investigating the epidemic. December 14. The Board of Health authorized the Health Officer to procure from the Pasteur Institute, New York, a supply of antitoxin. Health Officer reports to date sixty-four cases in forty-two families with eleven deaths. December 16. A quantity of antitoxin was received and administered to three cases. December 17. To date sixty-seven cases; forty-four houses quarantined; thirteen deaths. December 18. Seventy-five cases; forty-seven houses quarantined; fifteen deaths. December 21. Eighty-seven cases; fifty-one houses quarantined; eighteen deaths. December 22. Ninety cases to date; twenty deaths. Forty-seven patients convalescent; twenty-three under treatment. December 28. The Board of Health declare the epidemic at an end. There are still seventeen cases under treatment, most of them for sequelæ.

There were 111 cases and 23 deaths during the month of December, 1894, of which 100 cases with 21 deaths were in families supplied with milk from the wagon driven by Henry Smith. The public schools reopened January 7, after a vacation of four weeks.

From the beginning of the epidemic, a rigid quarantine was enforced against the sick and all coming in contact with them. The convalescent were discharged from quarantine only after four weeks detention, unless a bacteriologic examination showed them to be sooner free from the disease. All infected houses were disinfected under the direction of an employe of the Board of Health. The adequacy of the means employed is evidenced by the fact that with over fifty houses quarantined there was no general spread of the disease, and in twenty-four days from the time the first patient was taken ill and eighteen days after the disease was declared epidemic, the Board of Health were able to declare the epidemic at an end.

Of the total number of cases of diphtheria occurring in that section of the city in which the disease was epidemic, I have received a detailed report of eighty-two cases. Of these fifty-nine cases received the usual treatment with iron, chlorate of potash, quinin and whisky internally; and peroxid of hydrogen or bichlorid of mercury as a spray. Of these forty-four recovered and fifteen died.

Of five cases treated with bichlorid of mercury and whisky internally and peroxid of hydrogen and lime water as a spray, four recovered and one died, or 20 per cent. mortality.

Of eighteen cases treated with antitoxin, sixteen recovered and two died, or 11.1 per cent. mortality.

In order to secure a broader field for comparison, I have obtained a report of 48 additional cases occurring in the city between Dec. 1, 1894, and April 15, 1895, making a total of 130 cases occurring in the practice of ten physicians. An analysis of these cases gives the following result:

Total number of cases of diphtheria treated, 130.

DETAILS OF TREATMENT.

	Ages of patients. Under 2 years.	Between 2 and 10.	Over 10 years.	
54 treated with serum.				
Recovered	2	26	22	—50
Died	1	1	2	— 4
76 treated without serum.				
Recovered	2	15	41	—58
Died	1	9	8	—18

Average age of those treated with antitoxin, 12 years.
Average age of those treated without antitoxin, 18 years.
Cases treated:

Bacteriologically proved to be diphtheria	47
Of these, treated with antitoxin	29
" " " without "	18
Not bacteriologically determined	83
Of these, treated with serum	25
" " " without "	58

Amount of serum used to each patient varied from 12 to 113 cubic centimeters.

All the cases recovered that were treated with antitoxin before the fourth day of illness.

The foregoing statement, while statistically correct, would be to a certain extent misleading without further explanation. In all the fatal cases the antitoxin treatment was begun after several days' illness.

Case No. 1, a boy 12 years of age, had been ill six days, was profoundly septic and had diphtheritic laryngitis which later necessitated intubation. He lived two days after the first dose of antitoxin.

Case No. 2, a young lady, age 28 years, had been ill six days and had received during that time the iron treatment. Like the previous case, she was suffering from both diphtheritic laryngitis and septicemia when she received the first injection of antitoxin. She lived five days after the first dose.

Case No. 3, a child four months old, received the antitoxin on the fourth day. It died of septicemia on the evening of the third day thereafter.

Case No. 4, a child 3½ years old, suffering from diphtheritic laryngitis, received an injection of antitoxin on the fourth day after the development of croupy symptoms. Intubation was done the evening of the same day. She lived three days and died septic. This child had had sore throat with swollen glands for several days previous to the beginning of the laryngitis, but a physician was called only when suffocation was imminent.

In the opinion of the attending physicians, life was prolonged in each of the fatal cases by the use of antitoxin. The two first cases were almost in *articulo mortis* when the remedy was injected, and yet lived two and five days, respectively, and in the latter case with good prospect of recovery.

In cases not treated with antitoxin, heart failure, occurring about the time of or shortly after the disappearance of the membrane, was a frequent cause of death. In one case, death in a patient 40 years of age was due to a piece of membrane being drawn into the larynx during a violent fit of coughing. In another case a violent urticaria developed on the tenth day of illness and was followed two days later by persistent vomiting and threatened heart failure. Patient recovered.

The most frequent sequelæ in cases not treated with antitoxin, were paralytic in character. These varied in degree from slight aphonia or difficulty of deglutition to complete hemiplegia. Difficulty in locomotion, somewhat resembling the gait in ataxia, was observed in two cases. Double vision in two cases. Irregularity or intermittence of heart's action was frequent. In one case the symptoms were so alarming that the recumbent posture in bed was insisted on for a period of two months. Patient made a good recovery. Hemiplegia occurred in the case of a young lady 18 years of age, and was accompanied by aphasia. There was no loss of sensation. Motion of upper extremity is still confined, after five months, to flexion and extension of wrist and fingers and supination of forearm.

The sequelæ following antitoxin treatment were in general quite different in character, but in two instances where it was not given until after the third day, mild paralytic symptoms were developed. Urticaria was reported in seven cases and was probably present in some degree in others.

Rheumatism was reported in five cases and was in some instances quite severe for several days. Both urticaria and rheumatism also followed the use of antitoxin for immunization. Slight inflammation of the joints was reported in two cases. In no instances have abscesses followed the use of antitoxin, nor have there been other local symptoms, save mild erythema and some muscular soreness at the point of injection. Nor in a single instance have the constitutional effects of the antitoxin been such as to cause the slightest anxiety to the attending physician.

In most cases all other treatment has been omitted after the antitoxin was given, but in a few instances whisky was administered and an antiseptic spray used locally. There is no question in therapeutics upon which the local profession are more fully agreed, than upon the efficiency of antitoxin in diphtheria.

All the serum used at Ashtabula was procured of the Pasteur Institute, New York.

I regret that there is occasion to call in question many of the statements in an article entitled "A Dangerous Antitoxin," which appeared in the March number of the Cleveland *Medical Gazette*. Similar statements emanating from the same authority, have appeared from time to time in the public press. In the *Gazette* article the writer says: "Through the courtesy of Dr. A. W. Hopkins, Health Officer at Ashtabula, Ohio, I received a sample of a diphtheria antitoxin which had just been received from New York. This antitoxin was obtained from the same source as the supply which had been employed during the epidemic at Ashtabula a short time previously. Dr. Hopkins informed me that he took the sample from a freshly used bottle and then transferred it inadvertently to an empty bottle which had previously contained some of the same material."

Now, the facts are, and Dr. Hopkins authorizes the statement, that the empty bottle to which the fresh sample was transferred, had lain uncleaned in a warm room from four to six weeks. He further says that he informed the writer of the papers before their publication, of the facts and apologized to him for sending the serum under such conditions, "even to inject guinea pigs." If we recall the fact that blood serum furnishes one of the very best culture media, it will not excite surprise that an examination of other bottles kept under like conditions shows in every instance the adherent serum to have undergone putrefaction. The serum is described by the writer as "a thick slightly yellowish fluid containing a pronounced flocculent white precipitate; and it had a strong odor of camphor." Dr. Hopkins tells me that out of the whole amount of serum used in Ashtabula, about 100 bottles of 25 cubic centimeters each, in not a single instance has there been a precipitate even on keeping six or eight weeks, and in no instance have the results of a dose so long on hand been different from those of a fresh article. I think you will agree with me that the exhibition of serum obtained under such conditions that it could hardly escape infection, scarcely called for such startling head lines in the public press as the following: "Putrid Antitoxin. The Stuff used in Ashtabula. A Doctor's Discovery." Or the following: "Swarms of Bacteria. They are Found in a Sample of Antitoxin Such as Has Been Used at Ashtabula." But I will not weary you by a further discussion of the papers in question (since perhaps the author belongs to a class so pithily described by Dr. Holmes as being "always positive and sometimes inaccurate"). We are still using the same brand of antitoxin in the cases that are of frequent occurrence in the first and sixth wards.

In conclusion, I would summarize our present knowledge of diphtheria as follows:

Diphtheria is an acute specific contagious and infectious disease.

It is primarily a purely local disease, caused by an external parasite—the Klebs-Löffler bacillus.

The condition necessary for the production of the disease is the presence of the bacilli in quantity and activity sufficient to overcome the individual's power of resistance.

Diphtheria always results, either directly or indirectly, from a previous case, but unsanitary conditions have a great influence on the propagation and virulence of the disease.

As a rule, one attack confers immunity for a limited period.

The constitutional symptoms are due to the absorption of the poisonous products of the primary disease from the local lesion.

Changes occurring in the blood and tissues, and the various sequelæ, are caused by the direct or indirect action of the toxins or toxalbumins.

And finally, the discovery or rather the development of the antitoxin treatment of diphtheria is the greatest achievement of modern therapeutics.

DISCUSSION.

DR. H. M. W. MOORE, of Columbus—Beginning with December last, I have examined for the Health Board here in Columbus some eighty-one cultures, made at the bedside with the ordinary outfit. Of these cases, thirty were diphtheria and fifty-one were something else. The system of distribution of test tubes was to leave them in drug stores, and the outfits were collected by the Health Officers as they came in, in the evening. Under the extreme poverty, this was perhaps the best plan that could be adopted. However, the Health Officer was not likely to pass a drug store or call in immediately after test tubes were left, and it was often forty-eight hours before test tubes came into my hands after they were inoculated. That period was too long, but the system was probably the best that could be adopted under the circumstances.

DR. J. S. HALDEMAN, Zanesville, Ohio—I find upon close observation and comparison, that the European and American hospitals do not differ very materially in their percentum rate of mortality. This new method has drawbacks, and great ones, which the old one has not. It has them in the manner of its manufacture, the cost attending its purchase and administration, and in not being able to furnish it in sufficient quantities, and in due time for use in city, town and and country. By the old method, all places can be penetrated and all classes reached and satisfied. Now, which should we adhere to, the impracticable or the practicable? Wisdom says, the latter. Let us improve it, if possible. The mortality rate is not high in my own practice, which covers a period of about forty-one years. During that time I have practiced in several diphtheria epidemics. In the year 1878, when I was physician to the John McIntyre Children's Home, Zanesville, Ohio, there were thirty of the inmates down with it at one time, in its most malignant form. All recovered but one, and the matron thought he would have recovered if they could have made him take the medicine. This was a mortality rate of a small fraction over 3 per cent. Furthermore, I never lost but one patient in a family, and never in more than two families in the same epidemic. However, some practitioners in the same epidemics lost whole families.

DR. E. B. FULLERTON, of Columbus—I doubt very much whether we are to have in America the reported fatality of this disease in European countries, 40 to 60 per cent. I doubt whether in Columbus, Ohio, it has ever much exceeded 25 per cent. In some thirty cases there were but four deaths, that is 13⅓ per cent. In New York, Dr. Jacobi said the epidemic last winter, in his belief, would not, under the ordinary treatment, exceed 25 per cent. mortality. It has been claimed to be but 23 per cent. under the serum-therapy. Reasoning deductively we would take the serum as the least vitalized substance in the body, consisting principally of water and a few salts. How is the effect produced? Does it act as a poison to the microörganisms? Or, do we obtain a good result from it because it feeds the phagocytes? What has been the effect upon statistics, as to mortality, of methods of diagnosis? Have not there been introduced a larger number of cases under the same title? If we, by bacteriologic examination introduce many mild cases, we can easily reduce the percentage of deaths under any treatment. Was Henry Smith, who distributed the milk, among the cases that recovered; or, was he among the mild cases, which ordinarily would be called something else? I know when I was in Columbus even good physicians would reserve their diagnosis until they knew whether the patient would die or not. By introducing these mild cases is there not a chance for fallacy in the statistics? I have long believed the ordinary treatment of diphtheria is fallacious. What good can the tincture of iron do? We know iron is very little assimilated; it requires days, or perhaps weeks. What is the use of giving chlorate of potassium? One man has died under it, and we know that it is an irritant upon the kidneys. The tearing off of the membrane and the application of caustics is, in my opinion, faulty. I have had very little trouble with diphtheria since I have quit using these means, and have not used quinin.

DR. I. S. ERIGHT, of Akron—Because Smith did not die, but got well, after he distributed diphtheria in Ashtabula, does not argue that you must not give certain remedies. I have been passing through an epidemic of diphtheria, where the antitoxin has been used in some cases, and in some cases it has not been used. I am physician in the Children's Hospital at Akron, and am also Health Officer, and have had an opportunity to study the epidemic since the fourth day of

March. On March 21 I saw a boy with what I believed was diphtheria. Afterward I found him convalescent. Later, I found a boy who had scarlet fever. On the 28th the nurse was aroused by a peculiar cough from this boy. I was called at 5 o'clock and saw him at 6. I diagnosed diphtheria. My prognosis was unfavorable. The boy died March 30. In that hospital there were forty boys occupying a common bedroom; and sixteen girls in another common bedroom; and the children in the nursery in a common bedroom; and all eating in a common dining-room. I went to Cleveland, and Professor Ohlmacher came back with me on Saturday. We began with the antitoxin, and from the time we began using it in that hospital and in my private practice, I have not had a case of diphtheria, except two, that have not been examined bacteriologically, and there has not been a case but cleared up within twenty-four to forty-eight hours. There has not been a child, out of twenty-seven cases I have seen, but could drink from a bowl of water shortly after introducing the antitoxin, as well as any time before the attack. For instance, a colored boy, 7 years old, was seen on Friday when he was so hoarse he couldn't speak above a whisper; temperature 103.20; pulse 140. He looked like ashes. I fully anticipated he would follow the way of the white lad who didn't get any of the antitoxin. I gave him 5 ccm., and afterward 5 ccm. more, and at 4 o'clock the next day he sat up and sang with a clear voice. A German child, 7 years old, who had worn a tracheotomy tube since January 9, was seen by me on Thursday. I believe the tracheotomy was performed for polypi in her throat. When I saw her, her pulse was 140, and she had all the evidences of diphtheria. I gave 10 ccm. of the antitoxin at 4 o'clock in the afternoon. The next morning her throat was clear, and she has not taken a dose of medicine since. I saw her yesterday, sixteen days afterward, and she is well.

DR. J. A. MURPHY, of Cincinnati—There are hardly two cases in any epidemic, or under any circumstances that are alike. Take cholera or scarlet fever, for instance. And I have heard men, years ago, stand up in Cincinnati and say they never lost a case; and lo and behold, there comes an epidemic and they lose every case they have. Now, take this disease, diphtheria. We have a mild epidemic and the diagnosis is made by the good old practitioners who from their experience are able to make a clinical diagnosis. Few cases are lost. Then comes another epidemic and about one-half the cases will be lost. The Doctor has claimed the most remarkable results within forty-eight hours, or even less. Sir, he has had a very rapid action from this antitoxin injection, which is contrary to what I have read from others and what I have been told in the city of Cincinnati.

Dr. Case has laid down a proposition that these children, or a large number of them, contracted the disease from the man who carried milk around. He has given us no results of a bacteriologic examination of that man's throat. If he had diphtheria, how would the bacilli get into the milk? Would he spit them out? (Remark: Perhaps he drank out of the dipper.) Now, our friend says, if you get a Löffler bacillus in the throat you are sure to have the diphtheria. Why, gentlemen, these bacilli are found for six weeks after the clinical manifestations of the disease are gone; and further, they are found in the normal throat. Now, there must be some little phagocyte or worm or bug, very virulent, which afterward destroys this Löffler bacillus weeks after the patient has had diphtheria, or where he has not had diphtheria. Now, if you find two or three, four, five, or six of these bacilli in the mouth, what does it mean? Should the patient have antitoxin? Will he have diphtheria? Will our friend from Akron propose to throw in 5 ccm. of the antitoxin? He says patients with Löffler bacilli in the mouth or nose are in danger. Of what? Of the toxins these bacilli make, and these toxins producing sepsis.

Now, the next point. The bacteriologist with skilled eye and a good microscope fails to find the Löffler bacillus in a good many cases of diphtheria. Such cases are diagnosed by your old-fashioned practitioners from clinical experience and observation. The gentleman who used the microscope to make a bacteriologic examination, will not deny that these are cases of true diphtheria, and yet he will stop and say, "I don't know," which is a very proper answer. Now, this is one of the conundrums. Facts often lie, but the quickest liars are figures. What has taken place in Germany? Hundreds and hundreds of people have rushed with their children to the hospitals, with mild and with malignant cases, greatly lowering the mortality. The same thing takes place without the antitoxin treatment. A hospital in New York has been mentioned. It has been said the statistics of that hospital in the last four or five weeks have had a doubt thrown upon them. In all these cases nothing is said about the local treatment and about stimulation. Dr. Eichberg said, when I asked him directly: "By no means will I throw aside the local treatment, peroxid of hydrogen, the iron and perhaps the bichlorid of mercury." Now comes the question which Dr. Ohlmacher has stated, about the manufacture of this antitoxin. How long is it safe? Who can explain the death of the woman the other day, in a very short time after the use of the antitoxin? If Dr. Ohlmacher's statement is true, this antitoxin ought to be put in a refrigerator and not kept long, but carried to the place and used immediately. And nothing has been said as to whether these are the sequelæ or the consequences of diphtheria: pneumonia, albuminuria, bronchitis and various other conditions which have immediately followed the antitoxin treatment.

DR. J. NORTH, Toledo—It has been said that figures lie. I believe there is a mistake in that. Figures do not lie, but figurers do lie. There has been a great deal quoted about the statistics of the past and the statistics of the present. I believe the statistics gathered during the last few months are the only ones of any value, because before then everything was reported as diphtheria, and now we know what is diphtheria and what is not diphtheria. Regarding the good results of antitoxin. Virchow, who was at first very skeptical about it, finally admitted the use of the antitoxin in his hospital in Berlin. After a time the supply of antitoxin was exhausted, while he was out of the city, and when he returned, about two weeks afterward, he found the mortality had increased to almost double what it was before; he went back to the use of the antitoxin, and the mortality went down to where it was before, when they used it. With such reports I think we can not go back on the figures. I have had no experience whatever in the use of antitoxin, because in Toledo we have had very little diphtheria since the antitoxin has come into use. But I believe in the use of it. I think the statistics justify it. Some one spoke of a woman who died from it, but for every one who dies from the antitoxin you can find a hundred graves marked diphtheria. And then, in connection with diphtheria we have the staphylococcus, which complicates the cases very much; and only recently we have an antitoxin for such cases. Where this antitoxin has been used, almost every case has recovered. Now, with the combined treatment of the diphtheritic antitoxin and the staphylococcus antitoxin, I think we will be able to save a much larger proportion of these cases. Because, statistics tell us, that where the Klebs-Löffler bacillus is found alone, we have much better results than when complicated, and if we have an antitoxin to counteract the other bacilli, we have something of very great value.

DR. JOSEPH EICHBERG, of Cincinnati—No question can be discussed, except by those who have had experience; and they are almost unanimous in favor of the antitoxin treatment of diphtheria. It is not fair to judge of its success from its effect in cases which would certainly die under any treatment. On the other hand, we should not say that more mild cases are being cited for this plan of treatment than heretofore. Nor does it change the position because the gentlemen who have had recourse to this treatment have retained the local treatment. Even with all these measures of treatment, cases have succumbed. Nevertheless the antitoxin treatment will save many cases. Such beneficial results were cited by the gentleman from Akron. The same results have not been obtained by any other remedy. The change in the appearance of the throat in twenty-four hours is almost magical, and it would be difficult for one not familiar with the plan to believe it, if seeing were not believing. There is no stronger argument, in my mind, as to the efficacy of the treatment than the statement by Professor Virchow, of Berlin. On repeating the facts to the Pathological Society, Professor Virchow says we can not explain the action of the antitoxin on any approved therapeutic plan, but any physician is culpable who does not use it. I would like to know Dr. Murphy's way of gaining information as to the value of treatment in any disease, if not from the computation of statistics from many sources. In the epidemic at Akron, where I believe seven out of twenty-seven cases died before the introduction of the antitoxin treatment, only one case died afterward, and it had not received the treatment until some two weeks after the invasion. The longer we delay the treatment, after the appearance of local symptoms, the greater is the danger to the patient. As to its curative properties, there can be no doubt in the mind of any one who has properly employed it, though its prophylactic value has not been clearly established.

(To be continued.)

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SATURDAY, JULY 27, 1895.

THE ACTION OF DIGITALIS ON THE HEART.

At the session of the Académie de Médecine held July 2, M. FRANCOIS-FRANCK reported a series of experiments in which he had studied the action of digitalis on the heart, and at the same time the effect of different digitalins.

On mammifera, administered in a therapeutic dose, digitalis produced uniform definite effects. It showed the beat of the accelerated heart; it regulated the beat of the arythmic heart; and it greatly augmented the systolic power and the diastolic resistance.

The author held that these effects were developed equally on the two sides of the heart, contrary to the views of M. GERMAIN SEE, who thought that the action of digitalis was greater on the right heart, and contrary to the German physiologists who held that the drug's power was manifested on the left heart. In a toxic dose he found that digitalis produced first an excessive slowing of the heart movement, but a special arythmic beat, which manifested itself by a dicrotic pulse. Afterward, the heart accelerates itself secondarily, becoming irregular; the contractions are precipitated by a sort of semi-tetanic ventricular movement interrupted by prolonged intermissions, finally causing death of the heart. In mammifera, as in cold-blooded animals, death is always produced in systole, and not in diastole, as has been affirmed.

The mechanism which produces these effects is described M. FRANCOIS-FRANCK as: 1, "the effects produced by the ventricles are not subordinate to a primary action on the auricles;" 2, "the action produced on the heart is not secondary to a primary action on the contractile vessels of the aortic system, as the gradual ascension of aortic pressure does not produce the same effects as digitalis, as those persist even when the heart is separated from the aorta;" 3, "the abatement of velocity produced by digitalis resembles neither that which is produced by suspension of the activity of the accelerator nerves of the heart, nor those produced by excitation of the heart moderators." "It seems then," says FRANCOIS-FRANCK, "that the action of digitalis is first manifested on the cardiac muscular fiber."

In regard to digitalin, the author stated that the fatal dose of French chloroformic crystallized digitalin was 0.7 milligrams to the kilogram of animal weight. That of the amorphous digitalin is tenfold greater; and that of German digitoxin is three times less.

One gram of the infusion of the leaves of digitalis produces the same action as five or six grams of digitalin, although one can extract but one milligram of the alkaloid. "It then seems probable," says the author, "that the active principles mostly reside in the leaf."

The infusion of digitalis has been a favorite method of administration in this country, because it has long been known that the digitoxin was the most active principle of digitalis, and it was believed that there were certain principles in the leaf that were not extracted by any of the existing methods. FOUQET[1] arranged the digitalins of commerce in two groups: 1, those insoluble in water and soluble in chloroform, *i. e.*, crystallized digitalin, amorphous digitalin and digitoxin; 2, German digitalin and digitalein.

The present paper of FRANCOIS-FRANCK will clear up some of the doubtful points in the physiologic chemistry of the action of digitalis.

THE GREATEST OF VIVISECTORS.

The late PROF. KARL LUDWIG is the subject of an earnest editorial in the London *Lancet*, based on a memoir by DR. MOSSO of Turin. The writer says that since the publication by MOLESCHOTT of his beautiful monograph on DONDERS, there has been given to the medical world no worthier *immortelle* to lay upon the tomb of a professional brother than Mosso's tribute to LUDWIG, his great master in physiology.

The editor, having first considered the scientific achievements of LUDWIG, thus proceeds to comment upon the humane side of his character:

"But on passing from LUDWIG the experimental philosopher to LUDWIG the man and the citizen, PROFESSOR MOSSO has much to tell the world of the deepest interest. 'LUDWIG,' he says, 'the greatest of vivisectors, was President of the Leipzig Society for the Protection of Animals, and remained to the last,

[1] Bull. Gén de Thérap, Jan., 1892.

one of its most active members.' Germany owes it to him that her horses and beasts of burden are now humanely treated. To him is due that awakening of the true humanitarian spirit toward the brute creation that culminated in the 'Verband der Thierschutz-Vereine des Deutschen Reichs' (Union of German Societies for the Protection of Animals). It was mainly from her sense of the gentler attitude to be encouraged toward animals on the part of the rising generation, that Leipzig made him an honorary citizen on the fiftieth anniversary of his graduation in medicine. 'No physiologist,' continues PROFESSOR Mosso, 'has ever sought with greater frankness than he to impose just limits on vivisection. The gates of his institute were ever open to all who wished to assure themselves that he, in the midst of his experiments, knew how to spare suffering. The vivisector's art attained such perfection in his hands that, having to sacrifice an animal, he did not let it feel that it was even being tied. He would apply the muzzle and instantly proceed to the exhibition of ether or chloroform, which in a few seconds, in a dog, for example, made it insensible. It is an error,' adds PROFESSOR Mosso wisely—'it is an error to believe that experiments can be performed on an animal which feels. The perturbation induced by pain in the functions of the organism is so profound as to render useless the experimenter's study. It was LUDWIG who uttered the celebrated *mot* that some physiologists, to study the nervous system, act like him who fires a pistol into a watch to see how the chronometer works. Suffering ought to be entirely eliminated from physiologic experiment, because the instruments we employ to-day are so delicate that they become unserviceable the moment the animal is agitated or moves.'"

The editorial of the *Lancet* closes with this eloquent peroration:

"Illustrative anecdotes without number might be multiplied to prove the real humanity of LUDWIG—of the man who was denounced on anti-vivisection platforms as the 'arch-fiend' of the 'Nine Circles,' and as the keeper of the worst 'torture den' in Europe. Well may the physiologist and the physician cry aloud, 'Humanity! what offenses are perpetrated in thy name!' PROFESSOR Mosso's masterly 'full-length' of a biologist, a teacher, and a philanthropic citizen, surpassed by none of his generation, ought to send a thrill of shame through the promoters of a mischievous propaganda which, mistaking sentimentality for sentiment, and morbid hyperesthesia for sound feeling, would have tied the hands of one of the most beneficent students of nature who ever devoted his life to the healing art."

Blank applications for membership in the ASSOCIATION at the JOURNAL office. Write for them.

DON'T NEGLECT YOUR SUMMER OUTING.

The *Medical Examiner* calls up the timely subject of the summer vacation for medical men. Our profession is quick to deal humanely with its overworked clients, as clergymen, brokers and weary housewives, and ship them off into the country or into the city, as the case may demand, but the physician is too frequently not so kind to himself. The *Examiner* calls up the case of the late DR. GOLDING-BIRD of London, who is reported as saying that he had worked himself into an early grave by economizing six weeks in the summer.

"The physician needs more active exercise and more sleep, too—fully seven hours—and as his sleep is often broken in upon at night, he should form the habit of sleeping at odd moments, even by day. The folly of incessant work is illustrated by the case of the brilliant DR. GOLDING-BIRD, who, a few months before his death, remarked to a medical friend, when his own great popularity was mentioned: 'You see me, at a little over 40, in full practice, making my several thousand pounds per annum. But I am to-day a wreck. I have a fatal disease of the heart, the result of anxiety and hard work. I can not live many months, and my parting advice to you is this: never mind at what loss, take your annual six weeks' holiday. It may delay your success, but it will insure its development. Otherwise you may find yourself at my age a prosperous practitioner, but a dying old man.'"

THE ANNUAL RECKONING.

The ASSOCIATION Treasurer announces that he is ready to send receipts for the annual subscriptions of members, who have not yet paid their yearly dues. The month of July should see the Treasurer's books well settled, but we understand that there are very many delinquents. The JOURNAL has been larger and better than ever before, and there is no valid reason why the annual dues should not be paid promptly. On the contrary, with the very material reduction of the advertising which is now taking place there is every reason why prompt payment should be made.

In response to certain statements made in the columns of some of our esteemed contemporaries, we think proper to inform them that immediately after the Baltimore meeting letters were addressed to every firm advertising medicinal preparations in the JOURNAL, informing them of the action of the ASSOCIATION, and requesting the publication of the formula. Several of them have responded by sending the name and amount of each ingredient in the compound, according to the letter of the ASSOCIATION resolution, some have asked for time to consult absent managers, and some have refused. Of the latter number one contract expired last week and has been

discontinued. Another expires this week, and the remainder will be dropped as fast as their contracts expire. There need be no apprehension that the ASSOCIATION instructions in the matter of advertising will be forgotten or passed over without action.

We once more take advantage of the occasion to urge upon the members the absolute necessity of strenuous efforts to increase the membership of the ASSOCIATION, not only to prevent regression, but to add more and more to the ever growing list. We very much wish to pass the 6,000 mark within the next three months. We are now issuing 5,700 copies every week, but as there are more than 100,000 physicians in the United States it is readily seen that the ASSOCIATION JOURNAL reaches comparatively few of them. In England no physician considers that he is in good standing unless he belongs to the British Medical Association. A similar *esprit du corps* in America would give us a membership of 60,000 at the very least. With such an organization there could be no question of the immense influence that might be wielded by the medical profession in America.

We have made gradual and steady increase for the last three years, but we must do more. Let us once more make a united effort to gather into the grand old ASSOCIATION every eligible medical brother in the United States of America. The doors are always open for the entrance of good men and they will be warmly welcomed by every man having the interest of the ASSOCIATION and of his profession at heart.

AN EXPIRING CRAZE.

The efforts made to bolster up the expiring KEELEY cure by special legislation last winter were in some few cases successful, to the extent of the passage of acts in its favor. As a sequel we have in a neighboring State a county resisting payment of bills of a gold cure establishment for the treatment of pauper drunkards, and it is probable that the constitutionality of at least one of these measures will be fairly tested in the courts. That a special proprietary secret method of treatment should be the recipient of State support, that the public funds should be drawn upon to pay for what is absolutely unknown, and is purposely kept so, lest its use should become extended, to the damage of its proprietor, or as one might naturally suspect, because it is feared that enlightenment as to its nature would damage public confidence in its virtue, seems a poor public policy, to say the least. Looking at it entirely from an extra-medical point of view, this would be the natural conclusion, and nothing but the most overwhelming evidence of its value, it would seem, ought to lead any one to support it. With the legal possibilities in the case we have nothing to do, but it would appear not at all improbable that a higher court might find flaws in such legislation on constitutional grounds.

One of the most interesting features of the subject, however, is the zeal of the believers in the gold cure for its extension and continuance. Like the female homeopathic devotee, they make it a sort of a *cult*, and would apparently sacrifice anything for its propagation. Of course, this would be naturally encouraged by the management of the cures, but it is in its way a psychologic phenomenon of interest. One noteworthy feature is that the enthusiasm is sometimes most marked in striking instances of the non-success of the treatment, as in the case of the late FELIX OLDBOY.

The non-success is revealing itself at the present time in various quarters and is becoming apparent to the laity as well as to the regular medical profession. The painstaking investigation of the REV. DR. BUCKLEY, though to some extent affected by the fact that some of the data obtained by him were evidently from strong partisans of the gold cure, only led him to the conclusion that there was nothing in it more efficacious for the drunkard than is found in the numerous temperance revivals which make no pretenses to secresy, and which claim to act only through mental influence and the exercise of the will of the subject. DR. BUCKLEY'S study has a decided value as that of a conscientious investigator, who could not possibly be charged with any professional prejudice against the so-called cure, and yet who was compelled to reject its claims in spite of labored evidence in its favor.

As regards medical evidences of its failures, one may say that they are coming to be in the experience of every practicing physician. Out of fifty-eight patients treated in 1894 at DR. CROTHERS' inebriate asylum, at Hartford, twenty-six were KEELEY graduates and eleven more had been under other so-called gold cure treatment.

While we may consider inebriety, or perhaps we should say habitual drunkenness, in some cases and to some extent, a disease or the result of defective organization, the most natural conclusion one can deduce from the success of the gold cure craze, is that its successful treatment is more dependent upon moral and mental influence than upon medication. It is to this undoubtedly that should be credited all the permanent cures that date from the KEELEY treatment.

THE JOURNAL ITSELF.

An old and valued member of the ASSOCIATION, whose opinion is greatly esteemed by the editor, was emphatic in his statement that the JOURNAL of last week was the finest number ever produced by the office. The constant effort is that every number shall be better than its predecessors, and sometimes we think we have fairly succeeded. But what our friend

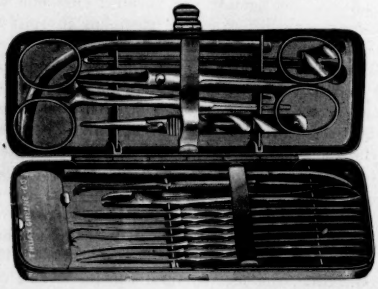
most commended was the plate in three colors printed in the JOURNAL office. He has a set of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION from the beginning, bound in uniform binding, and he said further that he was additionally proud of the JOURNAL now, because he as member of the ASSOCIATION is part owner of the great American medical weekly and its plant.

He should, he said, take an additional interest in the ASSOCIATION, and could see what had for years been foretold, had now come to pass, that the ASSOCIATION JOURNAL was second to none in America. This patriotic spirit now glowing brightly in the breasts of the American medical profession will bring organization, strength and power to our noble army of medical toilers, and a great reward. Let us redouble our efforts to increase the membership, by every honorable means, that we may not only become the greatest Association in the world in members, but first in quality of work done, and first in amount of knowledge promulgated for the welfare of humanity.

NEW INSTRUMENTS.

COMPACT POCKET CASE.

The attempt to make the smallest pocket case, on modern lines, has resulted, with the aid of TRUAX, GREENE & Co., in a case as represented in the accompanying sketch.



The new instruments in the case are the angle tenotome, and the short aluminum probe.

The cutting edge of the tenotome being on the inside of the angle, is very advantageous in dividing all tendons, but especially the smaller and deeper seated ones. The case is of metal, and the instruments small and delicate. The racks and partitions are movable, but the whole case can be boiled *in situ* without injury. JOHN B. HAMILTON.

CORRESPONDENCE.

The Woodbridge Treatment of Typhoid Fever.

TOLEDO, OHIO, July 14, 1895.

To the Editor:—One extremely warm day I found upstairs in a one and a half story house a poorly nourished young unmarried woman, with a temperature of 105 degrees. The temperature of the air in the room was unbearable to me. I had her removed to a room on the ground floor, and thought her trouble due to the intolerable heat to which she had been exposed almost constantly for several days. She soon became delirious which was followed in a few hours by a comatose condition which lasted three days.

The conditions surrounding the patient and the unusually rapid overpowering of the nervous system so masked the real disease that neither the physician who saw her in consultation nor myself diagnosed typhoid fever until the unconsciousness had passed away. Four other persons, two in the same house, and two in the house adjoining were taken sick at about the same time as my patient had been. These cases were diagnosed by their physicians as typhoid fever. One of them died in one week, and all of the others within two weeks from the time of taking sick. The disease in those cases was said to have been exceedingly virulent in character. My patient was removed to the suburbs, when all the conditions were favorable to the treatment of the disease. Of the few cases of typhoid fever which I had treated prior to that time none had died, and I felt comfortably confident that this patient would recover under what may be called the sulpho carbolate of zinc treatment. To my disappointment, however, she continued to grow worse until at the end of the second week of her sickness she was in the following condition:

Temperature 105 degrees, pulse 130, respiration 38. She was entirely unconscious, bowels moving unconsciously in bed. Urine drawn with catheter, tympanites very great, vomiting persistent and stercoraceous, hiccough present the great part of the time. An abscess had formed in external ear and had broken, without causing her to manifest pain. Bed sore over sacrum. Skin cold and clammy, but she would swallow liquids.

I regarded her case as being in the nature of a forlorn hope, but I ordered guaiacol m. v. rubbed over the distended abdomen every two hours, and ordered to be given by the mouth in emulsion, every fifteen minutes:

R. Hyd. chlor. mitis	gr. 1-16
Menthol	gr. 1-16
Guaiacol carbonate	gr. 4-16
Thymol	gr. 5-16
Eucalyptol	gr. 1-16.

I considered the patient's condition so desperate that I did not expect her to take many doses of the prescription.

After a few doses the vomiting and hiccough stopped, temperature fell, consciousness began to return, and in twenty-four hours the case presented an entirely different appearance. I dropped the calomel from the prescription after four or five hours, again introducing it after a day's rest. I tried giving larger doses of the other medicines at longer intervals, but the stomach did not bear the medicines given in that way so well. In a week the patient was sitting up and at the end of another week went to her home out of the city. She is now at work, and well.

I do not believe in ready-made prescriptions, but I most heartily concur in the opinion of my consultant who said "that it was a very creditable recovery." I do not care whether the credit is given me, or the prescription of Dr. Woodbridge, or whether it is said that the patient "must have had a strong constitution." I think it likely that a little more eucalyptol and a little less guaiacol would have done as well as the exact formula given by the Doctor, but I am sure that I did not attend to the details of treatment more faithfully while giving the second prescription than I had done while giving the zinc. I am equally sure that I did not stop the zinc until I was thoroughly convinced that the patient would die under that treatment. "Speak well of a bridge, etc." In the above case, I think the principle underlying Dr. Woodbridge's plan of treatment was such a bridge.

J. L. TRACY, M.D.

The Country Doctor.

EATON, ILL., July 18, 1895.

To the Editor:—In view of the restlessness that sometimes exists among country doctors, and their desire to remove to the cities; and in view of what has been said recently in the JOURNAL in regard to the city doctor, post-graduate schools and teachers, I desire to say a few words about the country doctor and his environments. In the first place, his field of operation is small and the possibility of his becoming famous is almost *nil;* but his usefulness in his locality is incalculable, and his living sure. He may not become rich in the common acceptation of the term, but he is generally —almost invariably in fact—in comparatively good circumstances. He is also an important member of society and his advice is sought for and generally appreciated, on all questions of general importance, or of public interest. He is the protector of the health of his community, and is always ready,and generally successful in preventing the spread of contagious diseases.

In times of epidemics his work is arduous, and he has many sleepless nights and weary days, yet he is usually cheerful, spreading sunshine among his patients wherever he goes, and is amply rewarded by the gladsome and appreciative smiles of his many patients and their friends.

He has no time for the blues and gives but little thought to the wolf which he knows full well is not at all liable to come to his door. His responsibilities are great, and none realize their weight more than he; but his almost superhuman efforts as a student of medicine and everything that pertains to his professional career and the welfare of his patients, gives him an assurance that he is doing all that any mortal, with like ability, and under similar circumstances could do, hence he has a clear conscience, is able to enjoy his three meals a day, and sleep well when he gets a chance.

He takes a post-graduate course occasionally, for he realizes that if he would keep in the front ranks he must avail himself of every opportunity for acquiring knowledge, and he knows full well that an occasional visit to a medical center will enlarge his knowledge in many ways, beside furnishing an opportunity to familiarize himself with the most recent methods of treating disease, and enable him to treat many difficult cases which would wend their way to the city, but for the fact that they realize that the progressive home physician can treat them quite as successfully and with much less inconvenience to themselves. The country doctor will never treat all the difficult cases he meets with; but because of his superior knowledge and his realization of the difficulties to be encountered in many hazardous operations, he will send his patient to a medical center where he may receive the benefit of that wide experience which can only be acquired in a populous community.

I believe as a general practitioner the country doctor is the peer of his city brother, but as a specialist he is not; he is nevertheless a wonderful specialist when we consider the innumerable lines of his work. He is a broad-minded and generally a well-posted man, not only in a professional way but in literature, science, art, and even in politics he is not always a novice. He is, in his community, an important factor; he is the common adviser of his clientele, the one man —if such there be—who knows it all; the Great Mogul, the one indispensable entity, who is appreciated and remunerated beyond his fellows, and should be the best contented man on earth, and the one man who, when he ends his earthly labors, should be entitled to an upper seat in the doctors' paradise in the great beyond.

Truly yours, C. BARLOW, M.D.

The City Doctor.

NEW YORK, July 23, 1895.

To the Editor:—What you wrote recently about the large polyclinics is true. The urban physician has usually a large hustle to keep things going. The subject of hospitals cutting off thousands of dollars of legitimate practice ought to be more earnestly aired. In this, I am not a sinner for I do no hospital work. I once had charge of a small dispensary of the Medical Missionary Society, and while the work was among the very poor, some frauds would creep in.

Dr. David Webster, the associate of the late Dr. C. R. Agnew, once told me that he would rather examine a case in his office for a dollar, than for nothing in the dispensary. So having sent him cases that have paid his usual fee for examination, $10, I have also sent him the dollar ones.

The profession has deliberately prostituted itself into a great machine for producing fraud by its immense hospital work. The real poor should be treated by the State, and the medical aid should be rendered by a system of State service similar to the Army, Navy and Marine-Hospital bodies.

Yours respectfully, JOHN A. CUTTER, M.D.

Sublimate Poisoning.

PHILADELPHIA, July 22, 1895.

To the Editor:—Under Philadelphia Notes in your issue of July 20, you record a case of recovery from 15 grains corrosive sublimate.

Some five or six years ago one of my patients, a young married woman, in a fit of jealousy, swallowed two tablets of corrosive sublimate, grs. 7.7 each, with suicidal intent. Fortunately I was promptly called, was in the house within twenty minutes, and by the use of emetics followed by egg albumen, succeeded in saving the patient.

There was no salivation, but a subacute gastritis lasting about ten days resulted.

Respectfully yours, E. W. HOLMES, M.D.

PUBLIC HEALTH.

State Board of Health of Pennsylvania.—At an annual meeting of this Board, held July 11, at Marietta, Dr. S. T. Davis, of Lancaster, who for three years has been the President of the Board, was succeeded by Dr. Pemberton Dudley, of Philadelphia.

Women Medical Inspectors.—Three women doctors have been appointed in the summer corps of medical inspectors by the New York City Board of Health. All of them are spinsters: Miss Mitchell, M.D., Miss Deane, M.D., and Miss Weiss, M.D. The other doctors of the body offered no objection to the selection of these three inspectors, all of whom are said to be fully qualified to perform the duties of their office. Their salary is $100 a month, and the *Sun* has no doubt they will earn it by faithful service.

Water Supply of Cleveland.—The Ohio State Board of Health has refused the petition of the city of Cleveland to be allowed to discharge sewage from a new district into Lake Erie near the intake of the city water supply. Mr. Allen Hazen of Boston was employed by the Board as consulting engineer. Investigation showed that the water supply is already polluted and statistics revealed that the typhoid death rate for the past seven years has been higher in Cleveland than in any other large city of the State. Plans for extending the intake into the lake are under consideration; but Secretary Probst is of opinion that, while this may afford a temporary remedy, all the lake cities will eventually be compelled to resort to filtration for the purification of their water supplies. A better way would seem to be to prevent pollution by a proper disposal of sewage.

Board of Health of New York State.—Dr. Florence O'Donohue's term of office as a member of the State Board of Health ceased, and Governor Morton appointed Dr. Frederick W. Smith, of Syracuse as his successor. Dr. Smith is an alumnus of the New York University, in 1880. The Board

of Health appointed Dr. O'Donohue a short time ago a member of a committee to carry out the provisions of the Public Health law relating to tuberculosis in cattle. In the appointment of Dr. O'Donohue's successor it was understood in the Executive Chamber that Dr. O'Donohue would continue as tuberculosis commissioner at a salary of $250 a month and necessary expenses. Both of these physicians reside at Syracuse. Dr. Smith has not any great amount of sanitary achievement to his credit thus far, but he is spoken of as an energetic and alert man.

Anti-Tetanic Serum.—Professor Vaillard is very sanguine that the preventive use of the serum of animals rendered immune against tetanus is likely to prove of signal service in the tropical regions where tetanus is so common after slight wounds as to be one of the most frequent causes of death. He also predicts a wide field of usefulness for the serum in preventing tetanus among new-born infants in some countries of Northern Europe, where trismus sometimes carries off 60 per cent.; also in military surgery and, generally, in the restricted area in which the specific bacillus of tetanus is indigenous; and, finally, in veterinary surgery where tetanus often follows wounds of the feet or castration. It is in the preventive field that it is most valuable; as a curative agent it is effective only in the rare cases in which the poison acts slowly; applied in the treatment of man or animals stricken with acute tetanus it is of no more avail than other remedies.

Diplomas for Disinfectors.—The government of the Grand Duchy of Mecklenburg-Schwerin by a decree dated May 29 has decided to grant a diploma for "Disinfector of Apartments." The candidates will have to undergo a special examination before a medical commission at Rostock, and only those who pass will be allowed to call themselves "Licensed Disinfectors of Houses." They will have to swear always to faithfully observe the rules for disinfection and to execute carefully and conscientiously all sanitary works confided to them. In the exercise of their duties they will be placed under the surveillance of the Rector-Physikus and the local police.[1]

Comparative Marriage and Birth Rates of Europe.—M. Cherrin has collected the following statistics concerning the percentages of marriages and births in the principal countries of Europe.[2] In 1,000 inhabitants of both sexes over 15 years of age the following percentages are married: Hungary, 91.6; Germany, 53.0 England and Wales, 52.6; Denmark, 52; Austria, 51.3; Italy, 50.1; Finland, 49.2; Holland, 49.0; France, 48.8; Belgium, 41.9; Greece, 41.6; Scotland, 40.9; Switzerland, 40.8; Ireland, 23.0. But the number of marriages is only one of the elements in the problem of increased population. The important thing is the fecundity of these unions. The following table shows this:

	Legitimate live births for 1,000 women (married) 15 to 50 years of age.	Illegitimate live births for 1,000 unmarried women 15 to 50 years of age.
Germany	270	26.5
Scotland	269	19.9
Belgium	265	19.8
Italy	251	24.6
England and Wales	250	12.1
Austria	250	44.4
Sweden	240	
Ireland	240	4.1
Switzerland	236	10.2
France	163	16.7

Sanitary Importance of Clean Streets.—Commenting upon the action of the New York City Board of Estimate and Apportionment, in authorizing an issue of bonds sufficient to meet the greatly increased expense of the more efficient street cleaning under Mayor Strong, the *New York Medical Journal* indulges in the following remarks, which have a special pertinence to another large American city, where not only clean streets but some other problems of sanitary administration are just now attracting an unusual amount of attention: "It is the duty of the medical profession to take an active part in furthering all plans calculated to improve the public health, and we feel justified in directing attention to the sanitary importance of clean streets, and in asking members of the profession at large to do all in their power to aid the city authorities in their good work. The power of the profession to influence public opinion is enormous, and the power of public opinion to help or hurt public officers in their work is still greater. Public opinion is really the one irresistible force in our government. Backed by it, an officer can do almost anything; opposed by it, he can do nothing; while if it is indifferent in regard to some course decided upon by an officer, he may succeed in doing much, but his success will depend entirely upon his personal ability to work under a heavy strain."

A Typhoid Fever Panic.—The *Medical Press and Circular*, June 5, relates an incident of fever prevalence, in an isolated part of the western Highlands of Scotland, which created a decided panic. The following is a part of the narrative in the *Press:*

"A curious incident has lately been reported from Mingalay, a remote island off the northwest of Scotland. It is given on the authority of Dr. Ogilvie Grant, medical officer for Inverness-shire, to which county the island in question is attached for administrative purposes. Some time since a girl brought back the infection of enteric fever to Mingalay. After a while the rest of her family, six in number, contracted the disease. In the meantime a panic seized the neighbors, who one and all deserted the place. The father was then attacked and died, but no one would help to bury him. A priest, however, at length came to the rescue, put the body in a coffin and dragged it out of the house to a distance of ten yards. A similar scene occurred two days later upon the death of the mother. It appears that the district is too poor to pay for proper medical attendance for the poor. But surely, if a medical officer of health be provided, it should be possible to furnish a small staff to cope with the emergencies that are bound to arise from time to time in connection with infectious fevers."

Neglect of Vaccination in North Carolina.—The *Bulletin* of the North Carolina State Board of Health, for June, contains liberal selections from an address, on sanitary progress in that State, delivered by President Tucker at the recent meeting of the State Medical Society. The medical officers of both State Board and State Society note with regret a too general apathy in respect of the prevention of smallpox by the use of vaccination. Dr. Richard H. Lewis of Raleigh, Secretary of the State Board, has given much attention to the subject without being able to effect a change for the better. The remarks of Dr. Tucker on this subject were, in part, as follows:

"Let us for a moment consider the question of vaccination. For many years past the worthy Secretary of the Board of Health has reported to this Society an increased indifference on the part of the profession and the people to this great preventive measure, and in a recent session he announced from the floor of this Society that, in his belief, nothing short of a visitation of an epidemic of this dread disease, smallpox, in our borders will arouse the people to the sense of their danger and impress upon them the necessity for vaccination. We have no statistical data upon which to base an opinion, but a conservative estimate would leave more than half of our people, ages and classes considered, without the benefit of this great prophylaxis, and when we consider the increasing number of epidemics of smallpox occurring in the more populous Eastern States, the increased facilities for travel and the changed habits of our people with regard to travel, many thousands going and returning from the great centers of population, thereby subjecting themselves to the danger of contracting a disease which, once set on foot in our State, will grow into a conflagration

[1] La Semaine Medicale, No. 32, 1895.
[2] Les Nouveaux Remedes, No. 12, 1895.

more appalling, if possible, and more difficult of suppression *than a prairie fire in mid-summer*, we may well counsel together about matters of prevention. In the sparsely populated condition of our State it would be *impracticable to enforce compulsory vaccination*, the law would be cumbrous, expensive and difficult of execution; but we can and should secure the enactment of a law making it *compulsory in our public schools;* indeed, we might go a step farther, and make a certificate of vaccination a pre-requisite to entrance in any school whose doors are opened for public patronage, and we, as physicians, who are charged with the sacred duty of maintaining the health and promoting the well-being of the people, should resort more frequently to vaccination in our own private practice, remembering that the best 'starting point' is *at the physician's own household;* through these combined agencies, in a few years, we may hope to have the larger portion of our people brought under the influence of this great prophylactic measure, and thus aid our Board in the accomplishment of a work which has occasioned so much anxiety."

Mismanagement of New York's Water Supply.—New York is not the only city that has been called upon to suffer from corrupt trickery. It has recently come to light that a false scarcity of water has been purposely produced in order to favor the designs of contractors and their friends. The *Independent* refers to this trickery in its issue for July 11. It says:

"We have all been getting gradually wonted to this scanty supply, after the characteristically American way we have of submitting to, as inevitable, abominations which could be thrown off were we not too easy-going and unorganized. The trouble has been generally attributed to insufficient supply at the sources, which we have been induced to believe have been outpaced by the growth of population. But as one of the results of the uprising of last November there comes now the astonishing discovery that the trouble is of the opposite character, to-wit, closed gates, the conclusion from which is that although the Croton sources may not be so ample as desirable, it is uncertain whether they are not adequate to present needs, under a free flow, because that flow does not exist. How many gates are closed and virtually abandoned seems to be a matter of slow discovery and, at present, of conjecture, but some estimate the number as high as a thousand. Opinion is divided as to the cause. Some think the chief cause the neglect of employes to reopen gates which have been closed for convenience while working near them; others, that the mischief has been done in course of a deliberate plan to force the taxpayers to consent to construction of new aqueducts, which would mean large opportunity for stealings. However, the closed gates are ligatures, and the flow is suffering under stricture. How many gates are in this condition and how many are rusted out and spoiled, nobody appears to know. The narrative tells us that there is no trustworthy map anywhere by which to find either the location or the number of gates, and apparently the only way to find out is to search for them. When we reflect that New York underground, like New York aboveground, has developed without any consistent plan, and when we remember that its municipal operations have for many years been devoid of system and responsibility, managed only by jobbery and plunder, it is not hard to understand how this condition came about or to believe that it may be even worse than is suggested. Naturally, the underwriters are aroused after having long been uneasy. Our great fire has not come, but the concentration of values down-town is enormous, and only the requisite conditions are awaited. A great fire makes its own wind. The old suggestion of a supply comes from the inexhaustible bay comes up again. In connection with it the scheme, also old, for a system of roof pipes in the mercantile district is appropriate. Salt water is suitable for many purposes, and the cost of stand pipes and pumping will probably compare favorably with that of new aqueducts."

Health Reports.—The following health reports have been received by the Supervising Surgeon-General, Marine-Hospital Service:

SMALLPOX—FOREIGN.

Russia: Batoum, June 25 to July 2, 4 cases, 1 death; Moscow, June 22 to 29, 1 case; Odessa, June 22 to 29, 8 cases; St. Petersburg, June 15 to 22, 4 cases, 2 deaths.

Hungary: Buda-Pesth, June 17 to July 1, 7 cases and 2 deaths.

Holland: Rotterdam, June 30 to July 6, 6 cases.

Egypt: Cairo, June 10 to 17, 2 deaths.

England: London, June 30 to July 6, 42 cases, 3 deaths; Manchester, June 22 to 29, 2 cases.

India: Calcutta, June 1 to 8, 27 deaths.

Ireland: Dublin, June 30 to July 6, 11 cases.

Gibraltar: June 23 to 30, 1 case.

China: Hong Kong, June 1 to 8, 1 death.

Brazil: Rio de Janeiro, June 15 to 22, 21 deaths.

Germany: Prague, June 22 to 29, 4 cases.

Mexico: Nogales, June 30 to July 13, 12 cases.

Scotland: Glasgow, June 30 to July 6, 1 death.

Uruguay: Montevideo, June 8 to 15, 1 case.

SMALLPOX—UNITED STATES.

Louisiana: New Orleans, June 18 to 22, 7 deaths; July 6 to 13, 4 cases, 2 deaths.

Michigan: Smallpox reported, 13 at Battle Creek, Detroit and Olivet.

Missouri: St. Louis, July 6 to 13, 6 cases.

CHOLERA—FOREIGN.

India: Calcutta, June 1 to 8, 16 deaths.

Japan; Hiogo, June 13 to 22, 39 cases, 26 deaths.

Turkey in Asia: Adana, May 25 to June 1, 50 cases, 30 deaths; June 1 to 15, 550 cases, 300 deaths; Mersyna, May 28 to June 1, 3 cases, 1 death; June 1 to 15, 2 cases, 2 deaths; Tarsus, May 18 to June 1, 470 cases, 315 deaths; June 1 to 15, 750 cases, 530 deaths.

YELLOW FEVER—FOREIGN.

Brazil: Rio de Janeiro, June 15 to 22, 12 deaths.

Cuba: Cienfuegos, July 7 to 14, 3 cases, 1 death.

Mexico: Vera Cruz, July 4 to 11, 3 deaths.

CONSULATE GENERAL OF THE UNITED STATES OF AMERICA.
RIO DE JANEIRO, June 25, 1895.

Sir:—I have the honor to remit report for week ended June 25, 1895:

There were 9 deaths from accesso pernicioso, a decrease of 3; 12 from yellow fever, a decrease of 4; 21 from smallpox, an increase of 12; 3 from enteric fever, a decrease of 2, and 1 from measles. From all causes there were 345 deaths, an increase of 29 over the foregoing week.

Cholera.—I think we may safely leave this disease out of account, as it appears to have entirely disappeared from the city; not even are the cases of diarrhea and enteritis any longer called choleriform.

Yellow Fever.—This disease is declining gradually as it always does at this season of the year, and causes no alarm at present.

Smallpox.—This disease is slowly increasing as the winter advances. I have heard of no cases among the shipping, though I would advise additional caution and warn the shipmasters I see to protect their crews by vaccination. Good lymph can be obtained here from the Municipal Institution. On the whole, the health of the port may be considered good, the higher mortality being due to diseases of the air passages which are prevalent always during the fall and winter months. Respectfully yours, R. CLEARY, M.D.,
Sanitary Inspector, M.-H. S.

NOGALES, ARIZ., July 15, 1895.

Dear Sir:—I have the honor to report one new case of smallpox in Nogales, Ariz., and three new cases in Nogales, Mexico.

I have received what I believe reliable information that yellow fever is prevalent in the following cities, viz.: Sonsonate and Santa Ana, Salvador; Champerico, Guatemala; Tapachula and Ocus, State of Chiapas, Mexico. All these cities being on the Pacific Coast, passengers pass through here from there via Guaymas frequently, and from them I have received this intelligence.

Very respectfully, W. F. CHENOWETH,
Sanitary Inspector, M.-H. S.

NECROLOGY.

JACOB P. COWAN, M.D., of Ashland, Ohio, died July 8, aged 72 years. He was a graduate from the Starling Medical College in 1855. He had been prominent in political affairs in his section, having served as a member of the Ohio Legislature about forty years ago. He was also an ex-member of Congress from the Fourteenth District of his State.

EZRA GRAVES, M.D., of Amsterdam, New York, died July 1, aged 56 years. He was a graduate of the Medical Department of Buffalo University, in the year 1865. He was coro-

ner of Montgomery County for several years, beginning in 1880, and the city physician of Amsterdam in 1894. He was Secretary of the Northern Branch of the New York State Medical Association.

STEPHEN E. FULLER, M.D.—The following resolution was adopted by the Kings County Medical Association at its regular meeting June 11, 1895:

WHEREAS, Dr. Stephen Edward Fuller, an old and highly esteemed member of this Association, has been removed from our membership by death;

Resolved, That this Association, while bowing to the inevitable and mourning its own great loss, tender to the widow and family our sincere and heartfelt sympathy in their affliction. GEO. A. OSTRANDER, M.D., THOS. M. ROCHESTER, M.D., } Committee.

PROF. FRANZ VON RIED, at Jena, Germany, aged 85. He was professor of surgery in the University of Jena from 1846 to 1884, when he retired.

JAMES CALEB JACKSON, M.D., who, nearly forty years ago, founded the Jackson Sanitarium, at Dansville, N. Y., died in New York City, July 11, in his eighty-fifth year. He was formerly an editor of the *Liberty Press*, of Utica, and was a co-worker with Gerrit Smith, Garrison and other antislavery leaders. He was primarily a water curist and vegetarian, but in later years he was less of an extremist.

WILLIAM S. HOUSINGER, M.D., of Chazy, N. Y., July 15, aged 74.——G. M. Thompson, M.D., of Boston, Mass., July 13, aged 82.——George H. Saltsman, M.D., Alliance, Ohio, July 12, aged 76.——George K. Smith, M.D., of New York, July 15, aged 67.——A. W. Crawford, M.D., of Emlenton, Pa., July 14, aged 81.——Edward Loomis, M.D., of Dodgeville, N. Y., July 7, aged 89.——G. W. Griggs, M.D., of Evant, Texas, July 20, aged 76.——J. W. Morris, M.D., of Leavenworth, Kan., July 20, aged 73.——J. W. Christopher, M.D., of Texarkana, July 17, aged 70.——S. R. Mitchell, M. D., of Hampton, Iowa, July 8, aged 69.——N. S. Halterman, M. D., of Glenwood, Minn., July 18.——James C. Jackson, M.D., of Le Roy, N. Y., July 10, aged 84.——L. D. Putnam, M. D., of Grand Rapids, Mich., July 22, aged 72.

BOOK NOTICES.

System of Surgery. Edited by FREDERICK S. DENNIS, M.D., Professor of the Principles and Practice of Surgery Bellevue Hospital Medical College, etc., etc., assisted by JOHN S. BILLINGS, M.D., LL.D., Deputy Surgeon-General U. S. A. Vol. II. Profusely illustrated. Cl., 8vo., pp. 918. Philadelphia; Lea Brothers & Co. 1895.

We have already recorded our favorable opinion of this excellent system, as set forth in the first volume, and we are pleased to notice that the second volume fully merits the warm praise given the first.

The contributors to this volume are Dr. Frederick S. Dennis, W. H. Forwood, George R. Fowler, Frederick H. Gerrish, Virgil P. Gibney, William W. Keen, Roswell Park, John B. Roberts, Nicholas Senn, Lewis A. Stimpson and Henry R. Wharton.

The topics discussed in the volume are Minor, Plastic and Military Surgery, Diseases of the Bones, Orthopedic Surgery, Aneurysm, Surgery of the Arteries, Veins and Lymphatics, Diseases and Injuries of the Head, Surgery of the Spine, and Surgery of the Nerves. The "System" so far as it has progressed, is a credit to American surgery.

Early Scoliosis or Curable Curvatures of the Spine. By PERCY G. LEWIS, M.D., M.R.C.S., etc. etc. 16 mo., pp. 49. Price 2s 6d. London: John Bale & Sons. 1895.

This little book is the result of the author's study of the cases which came under his notice at the Victoria Hospital, St. Andrews' Convalescent Hospital and in private practice. One of the principal points made by the author is on the effect of the twisting of the spine owing to weakness or atrophy of certain muscles, and as the muscles are weak, he considers that "the practice of gymnastics properly carried out, is the natural cure of scoliosis." The illustrations showing the method of applying gymnastic exercises are well executed and instructive. Every practical orthopedist will agree that there are many cases of early scoliosis that may be cured by gymnastic training.

The Amateur Sportsman. New York: Published by M. T. Richardson Co.

The July number of this publication contains a great amount of interesting matter relating to all phases of sport. The disciples of Izaak Walton and the Nimrods of the medical profession will take pleasure in the perusal of its pages.

MISCELLANY.

Disinfection of Tubercle-infected Houses.—Delepine and Ransome (*British Medical Journal*, Feb. 16, 1895) reported that the disinfection of apartments contaminated by the tuberculous could not be accomplished by the usual means of fumigation. Sulphurous acid is insufficient. The only efficacious method according to these authors is the application of a solution of chlorinated lime on the walls of the chambers. Sublimate has not proved efficacious. Exposure to sunlight is an important factor, and wherever possible the sunlight should be freely admitted for some weeks.

"The Medical Corpse of the Navy."—An odd misprinting of a paragraph in one of our most serious cotemporaries makes it perpetrate a sly dig at the medical branch of the United States Navy. The paragraph is:

"A number of deaths and retirements have made twelve vacancies in the medical *corpse* of the Navy, and the singular fact that these places are difficult to fill still exists."

Although the Naval surgeon's position does not compare favorably, in the minds of our profession, with that of the Army or Marine-Hospital surgeon, it must be said that the "corpse" is a lively one.

A New Biographical Sketch.—Oliver W. Nixon, M.D., is the author of a book entitled "How Marcus Whitman Saved Oregon," from the press of the Star Publishing Company of Chicago. A review of the book has appeared in the New York *Herald*, written in enthusiastic terms by Rev. George Hepworth. He says: "It is refreshing, like a southeast wind in August. It is stimulating, like some newly discovered tonic. I even went so far as to forget all about Whitman himself, in the interest of whose memory it is written, and gave myself with delight to the pictures of life on the plains and the devil-may-care ventures and adventures of the rugged fellows who can not live anywhere near the borders of civilization. When I finished this volume I felt as though a sort of blizzard had blown through me, and, I assure you, it was not an unpleasant sensation. The West is getting tame, but in the '40s, oh, in the '40s it was worth visiting. And this volume carries you back to those old times, with many a racy incident and many a deed of prowess. I have spent some pleasant hours with it."

Electricity in the Treatment of the Vomiting of Pregnancy.—Larat and Gautier, *Revue de Thérap. Méd. Chirurgicale*, VIII, p. 242, 1895, recommend galvanic electrization as the best remedy in the vomiting of pregnancy. The method is important; the positive pole should be applied under the clavicle between the insertion of the two tendons of the sterno-cleido-mastoid muscle; this positive electrode should be about the size of a silver half dollar, covered with a piece of wet chamois skin. The negative electrode should be placed over the epigastric pit. The current may be feeble; 8 to 10 milliampères are nearly always sufficient, but the precaution should be taken

to open and close the current slowly. The sittings should last from a quarter to half an hour, and repeated several times a day in case of obstinate vomiting. From twenty-four to forty-eight hours are required to effect a cure or marked relief. Ribes has also obtained equally good results by the use of electricity in the vomiting of pregnancy.—*Revue des Sciences Medicales*, 15 July, 1895.

Cæsarean Section, Symphyseotomy and Version in the same Female in Six Years.—The *British Medical Journal* quotes Chrobak concerning a case prolific in obstetric surgery. Chrobak has communicated to the *Centralblatt für Gynäkologie* his notes of a case of deformed pelvis, for whose relief Breisky had performed Cæsarean section in 1888, Chrobak himself delivering after symphyseotomy in 1891. The patient was recommended to see him from time to time, but she never presented herself till the autumn of 1894, when she was in labor. Circumstances led Chrobak to rely on turning alone; the child died during delivery. Version and extraction proved easy; the maternal soft parts were not damaged. The Cæsarean cicatrix in the uterus was found to have become considerably stretched; it was rigid and felt like a tough pad of muscular tissue. The symphysis pubis felt perfectly firm; the bones were united by a fibrous bridge not a third of an inch broad. The bones had not been sutured. The symphysis was not damaged during this third labor. The patient can now walk with ease. On rotation of the femur, slight mobility of the symphysis is noted.

A Chinese Doctor with an American Degree.—Miss Dr. Hu King Eng, the first of her race to acquire an American diploma in order to practice medicine in China, and the second woman of her race to take an occidental medical degree, is now on her way across the Pacific to her native land to inaugurate there a new era in woman's work among women. She is Dr. Hu King Eng, a charming, modest little woman, characteristically Celestial in every way, despite her nine years' residence in the United States. She has never discarded her quaint, rich native dress, and loves her own land best. She received her doctor's degree in Philadelphia a year ago, has spent the past twelve months in taking a post-graduate course and in obtaining actual experience in her profession, and a week ago she sailed from San Francisco for Foo Chow, where she will take up her life work as physician and missionary at the Woman's Hospital, an institution supported by the Woman's Foreign Missionary Society. While she is a pure-blooded Chinese, and proud of the fact, Dr. Hu King Eng was never a heathen, her family having been Christians for two generations. Her grandfather was one of the first natives converted in Foo Chow, and her father one of the first Christian ministers ordained in China. She has a brother in the Methodist ministry and a sister a teacher in a Methodist school in China.

Russian Meats for Export.—In the *U. S. Consular Reports*, for June, 1895, Consul-General Karel makes the following supplementary report on foreign markets for Russian cattle and meat. He stated in a former report that a commission had been appointed to work out a project for the development of cattle and meat exports and that said commission was divided into four categories. Since then, one branch of the commission has held a meeting and recommended the following measures:

1. To avoid the bringing of contagious cattle diseases from the northern Caucasus into the interior governments, it is ordered that sick cattle shall be killed wherever found.
2. The quarantine districts to comprise as small territories as possible.
3. To suspend the quarantine measures regarding the transportation of wool, because it has been established that wool does not spread contagion.
4. For the export of meat to England, to build special fast boats, which will carry no other freights that would taint the meats. These boats must sail under the Russian flag, and until they are built, an agreement is to be entered into with the Company of Sea Communications, to arrange its boats for carrying the meats.
5. To establish special agencies in England for the sale of Russian meats.
6. To build at Libau, the principal seaport for exporting meats, large ice houses and other arrangements to keep the meats in good condition.
7. Cattle to be transported on the Russian railways with speed.

The Last Contribution of E. R. Palmer, M.D.—The following is an item in the *American Practitioner and News*, June 29, written by the late Dr. Palmer, of Louisville. A few hours after receiving the journal containing the item, the telegraph flashed to us the sad information that the bright career of its writer had suddenly been cut short, and that, too, through the instrumentality of the favorite wheel, of which he wrote so jocundly in the paragraph here repeated:

"A Convention Episode.—At a recent meeting of the American Genito-Urinary Association at Niagara Falls, two staid married members from the City of Brotherly Love, by their manner and conversation gave the writer a mild sensation on the afternoon of the last day of the meeting. They were standing on the balcony of the Clifton House in a state of nervous expectation, when the following conversation took place: "Have you heard anything from them?" asked one. "No," said the other; "and they were to come down from Buffalo on this afternoon's train, sure." "Wonder if the train is in yet?" said No. 1. "Yes, half an hour ago," said the hotel porter standing by. "Well," continued No. 1, "it's plagued strange. They ought to be here at the hotel by this time, sure. One thing is certain, if they don't come I sha'n't stay the several extra days I had intended to spend here." "Nor I, either," said No. 2. To say that I was worked up, inflamed with a burning desire to see these charmers who were coming down, and that, too, right to the convention headquarters, is putting it mildly, and so, as a moment later, one of my friends exclaimed with delight, "Ah! here they come!" I quite naturally looked quickly in the direction of Suspension Bridge, only to see two messenger boys each trundling a *bicycle*. What a craze bicyclomania is indeed! E. R. P."

Forward Dislocation of the Fifth Cervical Vertebra.—(Ghyselink *Arch. Méd. Belges*, 1894, August.) Although the post-mortem showed a complete dislocation forward, together with a revolution of the vertebra on its transverse axis, so that the upper surface was directed forward, the vertebra itself was in front of the sixth cervical, and the spinal cord was, as it were guillotined, yet during life the differential diagnosis could not be made between fracture and dislocation. The patient, a soldier, age 23, was on duty as hostler. A fractious horse threw him under the crib, where he was found. His countenance was pallid; skin cold; legs, abdomen and lower half of thorax paralyzed; arms paretic, their strength, particularly the right hand, almost lost. Sense of feeling absent from below as high as the third intercostal space, markedly diminished in the arms, but normal on the head. The patient had severe pain in the neck. The skin was uninjured; there was a slight depression at the location of the fifth vertebra. Great pain on pressure over the first five spinous processes. Crepitus absent. The patient could voluntarily make slight motions of the neck. Respiration shallow, 30 to the minute, diaphragmatic. Palate and pharynx unaffected. Nothing abnormal could be felt in the pharynx. Retention of urine, moderate priapism, patella reflex wanting. Temperature in the axilla 36 degrees C. Skin everywhere painful, especially when touched. Patient anxious. Treatment consisted of the application of leeches to the neck, stimulants, injections of ether. At night it was necessary to use morphin. On the following day, hands and forearms were completely paralyzed, the latter elevated to the second intercostal space. Rectum paralyzed. Severe pains shooting from the neck. Gradually tympanites came on, coma and death on the fourth day.—*Centralblatt für Chirurgie*, No. v, Feb. 2, 1895.

Alcoholism in France.—France is just now considerably exercised over the question of alcoholism. Societies are being formed on all sides under the supervision of the "National League against Alcoholism." One of the largest of these promises to be the "Society against the Use of Alcoholic Drinks," started in Paris under the Presidency of Dr. Legrain, Physician-in-Chief to the insane asylums of the Seine. In a manifesto, which is to be scattered broadcast over France, the founders of the new society declare that "the time has come for all good citizens to enter on a campaign against a scourge which dishonors and ruins us." They add that they propose to propagate a knowledge of this evil in all walks of life, to agitate against it, to give an example in themselves in temperance by abstaining from the use of alcoholic drinks, to teach the principles of temperance in schools, and to organize school children into temperance societies. The dues are to be 1 franc, which is only to be collected from those over 16 years of age. They have also decided to distribute cards on one side of which is printed—"1. I promise to abstain entirely from brandy and liqueurs, save on a physician's prescription. 2. To make only a moderate use of wine, beer or cider." On the other side is the following: "The strength of a nation resides in the intellectual, moral and physical vigor of its children. Alcoholism enfeebles a nation and leads it to ruin." "To be temperate is to be a patriot." "Do not enter saloons except in cases of absolute necessity." The need for such societies seems to be urgent, judging from the following figures:[1]

Quantities of pure alcohol consumed in France:

	Absinthe, Bitters, etc. Hectoliters.	Other Spirits. Hect.	Total. Hect.
1881	25,904	64,081	89,985
1882	33,385	84,348	118,183
1883	38,497	94,998	133,405
1884	50,235	107,548	159,783
1885	57,732	106,078	163,810
1886	65,268	104,673	169,941
1887	74,178	110,436	184,614
1888	81,342	108,954	190,296
1889	90,438	113,708	204,208
1890	105,258	122,462	227,720
1891	110,598	127,327	237,920
1892	129,670	128,773	258,443

Hospital Notes.

HOSPITALS MUST BE PROVIDED WITH FIRE ESCAPES.—New York has the advantage of some new laws for the greater protection of the inmates of hospitals, asylums, etc. The district attorneys of the various counties have received from the Secretary of the State Commission in Lunacy a letter in which attention is called to chapter 381 of the laws of 1895. This enactment provides for the erection of suitable fire escapes on all hospital buildings used for general hospital purposes, or hospitals or asylums for the insane, or any hospital buildings which are more than two stories high. The letter in question charges the district attorney with a strict enforcement of this law, which, however, excepts hospitals and asylums maintained by the State, city or county. The law becomes operative on Oct. 1, 1895. A year is given in which to comply, but after that time the fire escapes may be erected by the authorities and the cost charged against the hospital or asylum.

ERIE COUNTY HOSPITAL.—Considerable warmth of feeling has materialized in Buffalo, N. Y., between the staff of the Erie County Hospital and a Committee on Management who are appointed by the Board of Supervisors. A delectable little farce by the faction held in power by the political anthropophagi of that city is the result. This committee, with a Holman-like propensity to reduce all expenses regardless of public safety, has rendered itself a stumbling block to the success of this hospital in question, and smarting under the publication of an article in the Buffalo *Times* which called attention to the faulty hospital system, held a meeting and recommended the dismissal of the hospital staff which consists of some of the best known medical men in Buffalo among others, Drs. W. S. Tremaine, Herman Hayd and John H. Prior. Three days later the committee experienced change of heart, reconsidered their hasty action and the staff still remains.——A site has been purchased by the Hospital Association of Evanston, Ill., for the purpose of erecting a hospital in that city.——Plans have been prepared to enlarge the hospital at Rutland, Vt.——The contract for the new Woods Run, Pa., hospital has been let. The cost of the building will be $12,000.——The Southern Pacific Railroad will build a railroad hospital in Oakland, Cal.——The Niagara Falls Memorial Hospital to be located at Niagara Falls, N. Y., was incorporated July 18.

[1] La Province Medicale, No. 25, 1895.

An Acute Coryza in Winter.—The *Chemist and Druggist* gives us the following: Little boy (with bad cold in the head): "Water is runnin' out of my nose all the time." Mamma: "That's because you went out in the cold with no hat on." Little boy: "I didn't know it was cold enough to burst my pipes."

THE PUBLIC SERVICES.

Army Changes. Official list of changes in the stations and duties of officers serving in the Medical Department, U. S. Army, from July 13, 1895, to July 19, 1895.

Col. CHARLES T. ALEXANDER, Asst. Surgeon-General, is granted leave of absence for two months, to take effect on or about July 18, 1895.

Capt. WILLIAM H. CORBUSIER, Asst. Surgeon, will, in addition to his present duties, take charge of the Medical Supply Depot in New York City, during the absence on leave of Col. ALEXANDER.

Capt. ADRIAN S. POLHEMUS, Asst. Surgeon, is granted leave of absence for two months, to take effect after his return to his proper station (Ft. Douglas, Utah), and at such time thereafter as his services can be spared by his post commander.

Capt. JULIAN E. CAHILL, Asst. Surgeon, is granted leave of absence for four months, on surgeon's certificate of disability.

Marine-Hospital Changes. Official list of changes of stations and duties of medical officers of the U. S. Marine-Hospital Service, for the fifteen days ended July 15, 1895.

Surgeon P. H. BAILHACHE, to assume command of Camp Low Quarantine, July 5, 1895.

Surgeon W. H. H. HUTTON, to report at Bureau for temporary duty, July 12, 1895.

Surgeon W. H. WHEELER, relieved from command of Camp Low Quarantine, July 5, 1895.

P. A. Surgeon C. E. BANKS, to proceed to Detroit, Mich., on special temporary duty, July 5, 1895.

P. A. Surgeon H. T. GOODWIN, granted leave of absence for thirty days, July 12, 1895.

P. A. Surgeon G. T. VAUGHAN, granted leave of absence for seven days July 6, 1895.

P. A. Surgeon J. B. STONER, to proceed to Detroit, Mich., for temporary duty, July 12, 1895.

P. A. Surgeon J. M. EAGER, to proceed to Southport, N. C., and assume command of quarantine station, July 6, 1895.

Asst. Surgeon W. J. S. STEWART, granted leave of absence for nine days, July 5, 1895.

Asst. Surgeon H. W. WICKES, granted leave of absence for twenty-three days, July 5, 1895.

LETTERS RECEIVED.

Asdale, W. J., Pittsburg, Pa.
Brill, Wm., Los Angeles, Cal.
Conner, J. J., Pana, Ill.; Carpenter, J. W., Omena, Cal.; Cleaves, M. A., New York, N. Y.
Dye, E. C., Fly Creek, N. Y.; De Garmo, W. B., New York, N. Y.; Davis, John L., Cincinnati, Ohio.
Fairchild Bros. & Foster, New York, N. Y.
Gardner, R. W., New York, N. Y.; Goss, E. L., Sheffield, Iowa; Gould, F. B., Kent, N. Y.; Gromberg, M. B., Providence, R. I.; Greenbaum, S. J., Louisville, Ky.; Gaston, McFadden J., Atlanta, Ga.
Hoadley, A. E., Chicago, Ill.; Hammond Sanitarium Co.; Hummel, A. L., Philadelphia, Pa.; Harymore, W. S., Hickory Grove, Ky.; Hollingsworth & Mathie, St. Louis, Mo.
Imperial Granum Co., New Haven, Conn.
Jenks, E. P., New York, N. Y.; Josephi, S. E., Portland, Ore.
Ketchum, G. W. A., Mobile, Ala.; Kober, Geo. M., Washington, D. C.; Kolb, M. G., Cleveland, Ohio.
Lentz, Charles, & Sons, Philadelphia, Pa.
Mill, C. K., Philadelphia, Pa.; Mansfield, F. L., Watertown, N. Y.; Maltine Mfg. Co., New York, N. Y.; Martin, J. A., Palestine, Ill.
Newman, H. P. (2), Chicago, Ill.
O'Gorman, James, Baltimore, Md.
Parke, Davis & Co., Detroit, Mich.
Riggs, Geo. H., Ijamsville, Md.
Simpson, John, Philadelphia, Pa.; Smith, Q. C., Austin, Tex.; The Sanitarium, Battle Creek, Mich.
Thayer, O. V., San Diego, Cal.
Upshaw, J. W., St. Louis, Mo.
Valentine, F. C., New York, N. Y.
Waters, J. W., Bachelor, Mo.; Wyeth, John, & Brother, Philadelphia, Pa.; Waite & Bartlett Mfg. Co., New York, N. Y.,